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105

FIRST CANADIAN ARITHMETIC,

INTENDED FOR THE
PRIMARY DEPARTMENT OF COMMON SCHOOLS.

BY
H. L. WHITCOMB.



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vince of Canada.

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PREFACE.

The distinctive character of this little work will appear from the following:

Instead of a short introduction to all the rules of arithmetic, leading principles only are introduced, and those are thoroughly elucidated both in theory and practice, while all voluminous explanations are avoided.

Mental exercises are combined with the written exercises throughout, and thus applied to the illustration of the *same principles*.

The important department of the simple rules is arranged in lessons according to the pages, a table forming the head of each lesson, and more copiously illustrated by examples than in any other arithmetic known to the author.

Analysis takes the place of proportion, it being *really* what the latter long *pretended* to, a key to most of the processes of arithmetic.

How much soever of reliance is to be placed on the teacher in giving life and interest to the recitation, books prepared on the model he pursues will best assist him in these respects, and will tend to produce uniformity in methods of teaching. No written system of numbers can by any means supersede the use of numerous oral exercises, both mental and written, and illustrations on the blackboard.

For the use of the inexperienced teacher notes are interspersed throughout the book, and the author would respectfully offer the following

SUGGESTIONS TO TEACHERS.

The mental exercises form the heads of lessons to be prepared by the pupils, but which should be extended and diversified by the teachers till the principle they embody is fully comprehended. No one principle can be passed superficially without loss to the future arithmetician.

In order to form habits of correctness and self-reliance the pupils should be instructed to *prove their work*; and for this purpose the answers to many of the exercises are not given. And if the teacher keep by him a book with the answers filled out in it, and accustom the pupils to number on their slates the exercises they work out, he can see at a glance, or by occasionally calling for their answers, whether they are working correctly.

Recitations in written arithmetic should generally be conducted by the use of the blackboard. A usual method is for the class to go up together, and work out the exercises appointed by the teacher in the order of their numbers, and afterwards in succession to give the demonstration, the most expert taking the precedence. By giving these demonstrations and the solutions of mental exercises in a clear and distinct tone, keeping before the mind the subject, and not words or rules, the pupils will acquire not only clear ideas of the principles of numbers, but also the power of expressing their ideas, and a natural and graceful elocution.

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1. ARITH
2. A nu
3. A un
4. Anal
5. A sir
- one denom
6. Nota
7. Num
- pressed.
- figures or
8. Thes
- their posi
- second te
- being equ
9. Thr
- following

Quadrillions.

| | | |
|-------|-------|--------|
| Hund. | Tens. | Units. |
| 7 | 9 | 4. |
| 18 | 17 | 16 |

The su
pions, O
NOTE.
nection

ARITHMETIC.

1. ARITHMETIC is the science of numbers.
2. A number consists of one or more units.
3. A unit is a single thing of any kind, as 1 book.
4. An abstract number is of no denomination, as 2, 4, 9.
5. A single number is an abstract number, or of but one denomination, as 3, 5 shillings.
6. Notation is the expression of numbers by characters.
7. Numeration is the reading of numbers thus expressed. The characters used in notation are the ten figures or digits, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0.
8. These figures have different values according to their position, the right hand figure being units, the second tens, the third hundreds; each order on the left being equal to ten of the order next it on the right.
9. Three orders make one period, according to the following,

NUMERATION TABLE.

| Quadrillions. | | | Trillions. | | | Billions. | | | Millions. | | | Thousands. | | | Units. | | |
|---------------|-------|--------|------------|-------|--------|-----------|-------|--------|-----------|-------|--------|------------|-------|--------|--------|-------|-----------|
| Hund. | Tens. | Units. | Hund. | Tens. | Units. | Hund. | Tens. | Units. | Hund. | Tens. | Units. | Hund. | Tens. | Units. | Hund. | Tens. | Units. |
| 7 | 9 | 4 | 3 | 6 | 7 | 3 | 2 | 6 | 8 | 4 | 7 | 3 | 6 | 8 | 9 | 1 | 6 |
| 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 Orders. |

The succeeding periods are Quintillions, Sextillions, Septillions, Octillions, Nonillions, Decillions.

NOTE.—Notation and numeration should be taught in connection with the simple rules.

PAGE

5

6

30

45

61

74

81

83

84

91

100

108

111

113

115

119

121

124

ADDITION.

7

Arithmetic are
Division.

TABLE.

| | | |
|-------------|--------------|---------------|
| $1 + 2 = 3$ | $5 + 2 = 7$ | $9 + 2 = 11$ |
| $2 + 2 = 4$ | $6 + 2 = 8$ | $10 + 2 = 12$ |
| $3 + 2 = 5$ | $7 + 2 = 9$ | $11 + 2 = 13$ |
| $4 + 2 = 6$ | $8 + 2 = 10$ | $12 + 2 = 14$ |

the sum of two

ends, and the

thus $5 + 2$

$=$ denotes

7.

h?

v?—in 2

How many

$1 = 10$

$1 = 11$

$1 = 12$

$= 13$

(7) (8)

10 3210

06 4628

—

- * 1. Add two successively to 50; thus, 2, 4, 6, 8, 10, &c.
2. John had 3 apples, and his sister gave him 2 more; how many had he then?
3. A man gave 1 cent to Harry, 2 cents to Emma, and 3 cents to Kate; how many did he give to all?

| (9) | (10) | (11) | (12) |
|-------|-------|-------|-------|
| 24113 | 22222 | 34212 | 24321 |
| 34123 | 58764 | 12634 | 41264 |
| — | — | — | — |
| (13) | (14) | (15) | (16) |
| 23214 | 14321 | 14213 | 31248 |
| 63412 | 83414 | 10142 | 83701 |
| — | — | — | — |
| (17) | (18) | (19) | (20) |
| 12314 | 32142 | 21021 | 32100 |
| 42344 | 64253 | 76235 | 61964 |
| — | — | — | — |

* These exercises with the tables are intended to give rapidity in adding. The pupil should be practised in them till able to add each figure successively to 100 without the least hesitation.

The *written* exercises will be distinguished from the *mental* by their numbers which are continued from page to page.

The *mental* exercises are intended rather as the heads of a lesson to be prepared by the pupil than a guide to the teacher. He should modify and enlarge them as circumstances shall seem to dictate.

13. The addition of simple numbers is called simple addition.

14. To add simple numbers,

Rule with example: Find the sum of 423, 345, 25 and 34.

| | | |
|----------|-----|--|
| Addends. | 423 | We write the addends units under units, |
| | 345 | tens under tens, hundreds under hundreds, |
| | 25 | &c. Then, commencing at the units we |
| | 34 | add (without naming the figures) thus 4, |
| | — | |
| Sum. | 827 | 9—14—17 units equal to 1 ten and 7 units ; |
| | — | set down the 7 units under the column |
| Proof. | 827 | added and carry the 1 ten to the next |
| | | column. Add the remaining columns in the same |
| | | manner, setting down the units and carrying the tens ; |
| | | because 10 of each order is equal to 1 of the next order |
| | | on the left. |

NOTE.—The pupils should early be made familiar with the names of the orders, their increase towards the left, and decrease towards the right in a tenfold ratio, and with the effect of removing a figure in either direction.

15. Proof 1. Commence at the top and add the columns downwards. If the two results are alike the work is supposed to be correct.

As this process reverses the order of the figures, any mistake made in the first operation is likely to be detected in the second.

Proof 2. Cut off the first addend ; add the others, and to their sum, add the first addend. The result should be the same as the first sum.

| (21) | (22) | (23) | (24) |
|-------|-------|-------|-------|
| 32414 | 14320 | 31034 | 63214 |
| 18365 | 42834 | 18264 | 63296 |
| — | — | — | — |

1. Add
2. Add
3. How
4. Kit
candy, h
many ?

(25)
2163
2263

(29)
3240
637

(33)
714
714

(3
11
12
14

(
2
4
1

ADDITION.

9

1. Add 2 successively to 100.

2. Add 2's to 100 commencing with 1.

3. How many are $7 + 2 + 2 + 2 + 2$?

4. Kitty paid 2 cents for cakes, and 3 cents for candy, how much did she pay for both? $2 + 3 =$ how many?

(25)

21632

22632

(26)

32142

64764

(27)

10233

34123

(28)

40204

14523

(29)

32404

63721

(30)

21042

61459

(31)

31610

45628

(32)

32147

92864

(33)

71468

71464

(34)

32187

32187

(35)

69789

60789

(36)

32168

78679

(37)

11021

12324

14213

(38)

32114

12342

13214

(39)

21102

14212

13121

(40)

31213

21042

33425

(41)

23241

41234

12351

(42)

40021

11234

42321

(43)

32102

12324

21423

(44)

44221

22334

44300

ADDITION.

TABLE.

| | | |
|-------------|--------------|---------------|
| $1 + 3 = 4$ | $5 + 3 = 8$ | $9 + 3 = 12$ |
| $2 + 3 = 5$ | $6 + 3 = 9$ | $10 + 3 = 13$ |
| $3 + 3 = 6$ | $7 + 3 = 10$ | $11 + 3 = 14$ |
| $4 + 3 = 7$ | $8 + 3 = 11$ | $12 + 3 = 15$ |

1. How many are $8 + 3$? $6 + 3$? $12 + 3$? $4 + 3$? $9 + 3$?

2. Harry paid 5 cents for a top, and 3 cents for a cord; how many cents did he expend?

| (45) | (46) | (47) | (48) |
|-------|-------|-------|-------|
| 22133 | 21421 | 10032 | 33232 |
| 23022 | 32130 | 12431 | 23123 |
| 32134 | 21142 | 43213 | 13321 |
| <hr/> | <hr/> | <hr/> | <hr/> |

| (49) | (50) | (51) | (52) |
|-------|-------|-------|-------|
| 31023 | 31021 | 10213 | 31023 |
| 32103 | 43210 | 31043 | 31323 |
| 62313 | 33634 | 21031 | 41433 |
| <hr/> | <hr/> | <hr/> | <hr/> |

| (53) | (54) | (55) | (56) |
|-------|-------|-------|-------|
| 13210 | 32341 | 34343 | 10431 |
| 13426 | 33123 | 43432 | 34234 |
| 13436 | 43243 | 34343 | 18476 |
| <hr/> | <hr/> | <hr/> | <hr/> |

NOTE.—The pupils should be taught to add without naming the figures; thus, in 41st example instead of saying 4 and 2 make 6 and 3 make 9, (merely touching the figures with his pencil) name the sum thus, 4—6—9.

ADDITION.

11

3. Add 3's to 50 ; ——— to 100.

4. Add 3's to 50 ; ——— commencing with 2, ——— 1.

5. Add 3's to 100 ; ——— commencing with 1, ——— 2.

6. A man gave 3 peaches to each of his four children,
How many peaches did he give to all?

$$\begin{aligned} + 3 &= 12 \\ + 3 &= 13 \\ + 3 &= 14 \\ + 3 &= 15 \end{aligned}$$

$$+ 3 ? 4 + 3$$

3 cents for

| (57) | (58) | (59) | (60) |
|-------|-------|-------|-------|
| 21023 | 23323 | 21324 | 21343 |
| 31203 | 33333 | 41233 | 33333 |
| 32313 | 34313 | 43343 | 31033 |
| 45300 | 50261 | 12510 | 41504 |

(48)

33232

23123

13321

| (61) | (62) | (63) | (64) |
|-------|-------|-------|--------|
| 13432 | 22212 | 21032 | 312102 |
| 42324 | 24343 | 34341 | 231230 |
| 23213 | 30234 | 32432 | 321433 |
| 35340 | 46341 | 54204 | 330975 |

(52)

31023

31323

41433

| (65) | (66) | (67) | (68) |
|-------|-------|-------|-------|
| 10216 | 21034 | 43213 | 23433 |
| 06123 | 34123 | 23433 | 36133 |
| 14332 | 32433 | 64333 | 43633 |
| 6354 | 34234 | 86343 | 12367 |

(56)

10431

34234

18476

| (69) | (70) | (71) | (72) |
|-------|-------|-------|-------|
| 21010 | 32610 | 52433 | 23333 |
| 42632 | 02321 | 62004 | 32433 |
| 23436 | 14333 | 23031 | 23044 |
| 89796 | 76389 | 97889 | 87682 |

thout naming
g 4 and 2 make
s pencil) name

TABLE.

| | | |
|-------------|--------------|---------------|
| $1 + 4 = 5$ | $5 + 4 = 9$ | $9 + 4 = 13$ |
| $2 + 4 = 6$ | $6 + 4 = 10$ | $10 + 4 = 14$ |
| $3 + 4 = 7$ | $7 + 4 = 11$ | $11 + 4 = 15$ |
| $4 + 4 = 8$ | $8 + 4 = 12$ | $12 + 4 = 16$ |

1. What is a unit?—a simple number?
2. What does addition teach?
3. $7 + 4 + 4 + 4 + 4 =$ how many?

| (73) | (74) | (75) | (76) |
|-------|-------|-------|-------|
| 24341 | 32102 | 20343 | 13102 |
| 43241 | 12341 | 20343 | 41234 |
| 43221 | 43214 | 20343 | 32146 |
| 14432 | 41234 | 28746 | 33240 |

| (77) | (78) | (79) | (80) |
|-------|-------|-------|-------|
| 16214 | 10410 | 31030 | 14342 |
| 32432 | 44236 | 43444 | 54342 |
| 43462 | 34340 | 41234 | 23463 |

| (81) | (82) | (83) | (84) |
|-------|-------|-------|-------|
| 10321 | 25043 | 21034 | 42103 |
| 46321 | 24342 | 86426 | 26436 |
| 21423 | 14324 | 36243 | 14442 |
| 60372 | 56344 | 16883 | 16628 |

| (85) | (86) | (87) | (88) |
|-------|-------|------|-------|
| 34431 | 14334 | 3244 | 23441 |
| 10444 | 14344 | 1024 | 44140 |
| 32544 | 43434 | 4034 | 23444 |
| 14324 | 34334 | 3543 | 44845 |

1. What are the numbers to be added called?
2. What is the result of the addition called?
3. Add 4's to 50;—to 100.
4. Add 4's to 100;—commencing with 2,—1,—3.
5. Hattie paid 5 cents for pens, 4 cents for paper, and 2 cents for pencils; what did she pay for all?

$$\begin{array}{r} 9 + 4 = 13 \\ 0 + 4 = 14 \\ 1 + 4 = 15 \\ 2 + 4 = 16 \end{array}$$

er?

(76)

$$\begin{array}{r} 13102 \\ 41234 \\ 32146 \\ 33240 \\ \hline \end{array}$$

(80)

$$\begin{array}{r} 14342 \\ 54342 \\ 23463 \\ \hline \end{array}$$

(84)

$$\begin{array}{r} 42103 \\ 26436 \\ 14442 \\ 16628 \\ \hline \end{array}$$

(88)

$$\begin{array}{r} 23441 \\ 44140 \\ 23444 \\ 44845 \\ \hline \end{array}$$

| (89) | (90) | (91) | (92) |
|-------------------|-------------------|-------------------|-------------------|
| 21043 | 13240 | 32104 | 32210. |
| 12342 | 34344 | 34343 | 4362 |
| 43244 | 43143 | 34344 | 1621 |
| 43423 | 43144 | 62343 | 4432 |
| <u> </u> | <u> </u> | <u> </u> | <u> </u> |

| (93) | (94) | (95) | (96) |
|-------------------|-------------------|-------------------|-------------------|
| 72103 | 14213 | 14121 | 10321 |
| 12144 | 44342 | 21021 | 10321 |
| 10123 | 34521 | 23126 | 4632 |
| 21072 | 42341 | 10436 | 2601 |
| <u> </u> | <u> </u> | <u> </u> | <u> </u> |

| (97) | (98) | (99) | (100) |
|-------------------|-------------------|-------------------|-------------------|
| 11241 | 32104 | 10321 | 34321 |
| 43262 | 43624 | 46302 | 44304 |
| 12303 | 40123 | 61236 | 24342 |
| 46384 | 32106 | 10206 | 43414 |
| <u> </u> | <u> </u> | <u> </u> | <u> </u> |

| (101) | (102) | (103) | (104) |
|-------------------|-------------------|-------------------|-------------------|
| 4424 | 3244 | 3441 | 3214 |
| 2433 | 4324 | 1432 | 4345 |
| 424 | 3323 | 1434 | 4324 |
| 433 | 4345 | 4561 | 4345 |
| <u> </u> | <u> </u> | <u> </u> | <u> </u> |

ADDITION.

TABLE.

| | | |
|-------------|--------------|---------------|
| $1 + 5 = 6$ | $5 + 5 = 10$ | $9 + 5 = 14$ |
| $2 + 5 = 7$ | $6 + 5 = 11$ | $10 + 5 = 15$ |
| $3 + 5 = 8$ | $7 + 5 = 12$ | $11 + 5 = 16$ |
| $4 + 5 = 9$ | $8 + 5 = 13$ | $12 + 5 = 17$ |

1. What does addition teach?
2. What are the given terms of addition?
3. What is the required term?
4. How are the addends written to be added?
5. Why do you carry for ten?

(105)

Find the sum of 5542455 and 863494.

(106)

How many are $2268340 + 45687098$?

(107)

How many are $170 + 360 + 28 + 312$?

(108)

Find the sum of $154 + 3265 + 54$.

(109)

43256

13246

13245

43214

32143

(110)

32141

14345

54354

45544

55324

(111)

41230

32440

32144

54610

54081

(112)

16032

14334

36755

10054

11246

(113)

326012

143241

325543

432434

121434

(114)

14321

45144

35434

14341

43214

(115)

63245

41234

43244

54234

55435

(116)

5250

5434

5355

5434

5355

ADDITION.

15

TABLE.

5 = 14
5 = 15
5 = 16
5 = 17

| | | |
|------------|------------|-------------|
| 1 + 6 = 7 | 5 + 6 = 11 | 9 + 6 = 15 |
| 2 + 6 = 8 | 6 + 6 = 12 | 10 + 6 = 16 |
| 3 + 6 = 9 | 7 + 6 = 13 | 11 + 6 = 17 |
| 4 + 6 = 10 | 8 + 6 = 14 | 12 + 6 = 18 |

- n? 1. A man bought 2 sheep at 6 dollars a head, and a
w at 20 dollars; what did the whole cost?
added? 2. John Mills bought a waggon for 20 dollars, he
ve 6 dollars to have it repaired, and 5 dollars for
enting; what did the waggon cost in all?

3494.

(117)

$$17 + 36 + 75 = \text{how many?}$$

098?

(118)

- + 312? A gentleman planted on his property 478 oaks, 784
beeches, 64027 firs, 690 apple trees, 160 pear trees,
and 300 other trees; how many trees did he plant?

4.

| (112) | (119) | (120) | (121) | (122) |
|-------|-------|-------|-------|-------|
| 16032 | 63543 | 36466 | 31023 | 33264 |
| 14334 | 25644 | 26533 | 14624 | 46354 |
| 36755 | 30556 | 26520 | 32635 | 46366 |
| 10054 | 66546 | 36426 | 74335 | 21046 |
| 11246 | 64848 | 36426 | 76216 | 36781 |

| (116) | (123) | (124) | (125) | (126) |
|-------|-------|-------|-------|--------|
| 5250 | 61002 | 32475 | 21006 | 712106 |
| 5434 | 43263 | 42364 | 32056 | 146305 |
| 5355 | 14326 | 46364 | 30556 | 165346 |
| 5434 | 23216 | 46734 | 70256 | 616564 |
| 5355 | 12789 | 16734 | 19856 | 364656 |

1. Add 6's to 72 ;—commencing with 3,—1,—

2. How many are $19 + 6 + 6 + 6 + 6 + 6 + 6$?

3. How many are $16 + 6 = 6 + 16$?

4. Emma is 7 years old, Kate is 2 years older, and Colin is 2 years older than Kate ; what is his age, and the sum of their ages ?

(127)

Find the value of $2632 + 365 + 4300 + 66321$.

(128)

$739 + 32 + 46 + 3654 + 30 + 66 =$ how many ?

(129)

Harry King had 19 geese, 45 turkeys, 150 hens, and 25 ducks, what is the number of his poultry ?

(130)

$145 +$ twice $145 =$ how many ?

| (131) | (132) | (133) | (134) |
|-------|-------|-------|-------|
| 24356 | 26463 | 54663 | 31021 |
| 43562 | 23654 | 64356 | 46063 |
| 34566 | 26463 | 56436 | 35466 |
| 43562 | 43654 | 46644 | 46563 |
| 34566 | 66463 | 12665 | 45466 |
| 43562 | 63654 | 10665 | 36563 |
| <hr/> | <hr/> | <hr/> | <hr/> |

| (135) | (136) | (137) | (138) |
|-------|-------|-------|-------|
| 36210 | 16036 | 31064 | 36102 |
| 63463 | 15465 | 63545 | 46104 |
| 34646 | 66546 | 63466 | 66506 |
| 63463 | 45436 | 63566 | 46506 |
| 34646 | 45646 | 56345 | 4564 |
| 63463 | 53346 | 10066 | 536 |
| <hr/> | <hr/> | <hr/> | <hr/> |

TABLE.

| | | |
|--------------|--------------|---------------|
| $1 + 7 = 8$ | $5 + 7 = 12$ | $9 + 7 = 16$ |
| $2 + 7 = 9$ | $6 + 7 = 13$ | $10 + 7 = 17$ |
| $3 + 7 = 10$ | $7 + 7 = 14$ | $11 + 7 = 18$ |
| $4 + 7 = 11$ | $8 + 7 = 15$ | $12 + 7 = 19$ |

1. If I pay 50 dollars for a horse, and twice as much for a waggon; what is the cost of both?

2. $6 + 7 + 7 + 7 + 7 + 7 =$ how many?

(139)

Richard gave 17 marbles to each of his 4 brothers; how many did he give to all?

(140)

A man has three farms, one containing 500 acres, another 243 acres, and another 176 acres; how many acres in the three farms?

| (134) | (141) | (142) | (143) | (144) |
|-------|-------|-------|-------|-------|
| 31021 | 72463 | 37104 | 32576 | 21043 |
| 46063 | 21463 | 46707 | 43747 | 72684 |
| 35466 | 72767 | 47663 | 34576 | 10550 |
| 46563 | 01264 | 36746 | 32747 | 32660 |
| 45466 | 72106 | 77637 | 63576 | 47660 |
| 36563 | 32147 | 26717 | 36747 | 74068 |

| (138) | (145) | (146) | (147) | (148) |
|-------|-------|-------|-------|-------|
| 36102 | 32136 | 36775 | 32603 | 72107 |
| 46104 | 42367 | 77456 | 72362 | 64736 |
| 66506 | 63676 | 36775 | 76324 | 86378 |
| 46506 | 37653 | 77456 | 47634 | 73647 |
| 4564 | 54673 | 36775 | 76047 | 37436 |
| 536 | 46876 | 77456 | 56754 | 63476 |

1. Add 7's to 70;—commencing with 3.
2. In 1 week there are 7 days; how many days are there in 3 weeks?
3. James has twice as many marbles as John, and John has 6; how many have they both?

(149)

A box contains 215 grammars, 327 reading books, 40 arithmetics, and 79 geographies; how many books are there in the box?

(150)

A man bought 7 horses at 75 dollars each; how much did he pay for the whole?

(151)

A man left 2766 dollars to each of his four children; what amount did he leave them?

(152)

There are four numbers, the first 12776, the second 3769, the third 17847, and the fourth 128 more than the first; what is the sum of the numbers?

(153)

$6789 + 5832 + 4671 + 8907 =$ how many?

(154)

762736
716213
216132
177641
146732
412761
123712

(155)

675476
126714
361236
210473
173472
623162
413214

(156)

763675
712132
237647
167367
234072
147766
417617

(157)

706345
706345
706345
706345
706345
706345
706345

1 + 8
2 + 8
3 + 8
4 + 8

1. A man
much at a
2. 8 +

Harry King
his com
himself

(1
823
416
88
46
88
43
83

(1
34
3
8
4
4
3
6
7

TABLE.

| | | |
|--------------|--------------|---------------|
| $1 + 8 = 9$ | $5 + 8 = 13$ | $9 + 8 = 17$ |
| $2 + 8 = 10$ | $6 + 8 = 14$ | $10 + 8 = 18$ |
| $3 + 8 = 11$ | $7 + 8 = 15$ | $11 + 8 = 19$ |
| $4 + 8 = 12$ | $8 + 8 = 16$ | $12 + 8 = 20$ |

1. A man borrowed \$8 at one time, and 3 times as much at another time; how much did he borrow in all?
 2. $8 + 3$ times itself = how much?

(158)

Harry King distributed a number of nuts among four of his companions, giving to each 27 nuts, and kept 27 himself; how many nuts had he at first?

| (159) | (160) | (161) | (162) |
|-------|-------|-------|-------|
| 82328 | 32107 | 32438 | 10710 |
| 41686 | 14706 | 14767 | 18763 |
| 88278 | 43807 | 34873 | 268 |
| 46876 | 47806 | 48747 | 732 |
| 88318 | 87387 | 16873 | 168 |
| 43726 | 47686 | 21687 | 7687 |
| 83268 | 14787 | 38078 | 3687 |

| (163) | (164) | (165) | (166) |
|-------|-------|-------|--------|
| 34681 | 71634 | 87645 | 67146 |
| 37600 | 34216 | 87645 | 36478 |
| 87630 | 88274 | 87645 | 374074 |
| 46784 | 48648 | 87645 | 736488 |
| 43867 | 18027 | 87645 | 874688 |
| 36847 | 18776 | 87645 | 836488 |
| 66728 | 18767 | 87645 | 884674 |
| 77184 | 38168 | 87845 | 798716 |

(157)

706345
 706345
 706345
 706345
 706345
 706345
 706345
 706345

1. Add 8's to 80;—commencing with 4, 2, 6.

2. A boy bought a fish hook for 4 cents, a line for 2 cents, a pole for 8 cents, and had 8 cents remaining; how many cents had he at first?

(167)

A farmer owned 11 horses, 57 cows, 210 sheep, and 3 pigs; what is the number of his live stock?

(168)

A man paid \$86 for a horse, twice as much for a carriage, and \$79 for a harness; what did the whole cost?

| (169) | (170) | (171) | (172) |
|-------|-------|-------|-------|
| 72683 | 71063 | 36872 | 91076 |
| 16776 | 14862 | 63789 | 36871 |
| 10376 | 16873 | 37867 | 6877 |
| 62438 | 34836 | 68476 | 6877 |
| 37268 | 67836 | 62378 | 6877 |
| 36726 | 67878 | 87368 | 9867 |
| 71683 | 36878 | 86786 | 1837 |
| 62738 | 84878 | 76878 | 837 |
| 7608 | 7896 | 7698 | 1890 |
| 9698 | 9986 | 9898 | 6258 |

| (173) | (174) | (175) | (176) |
|-------|-------|-------|-------|
| 46732 | 12788 | 46767 | 8767 |
| 71072 | 37168 | 18324 | 8710 |
| 45378 | 8674 | 14768 | 7710 |
| 45387 | 2687 | 76873 | 8768 |
| 62736 | 7867 | 68736 | 18768 |
| 87368 | 2637 | 86748 | 78768 |
| 16877 | 7786 | 73687 | 78768 |
| 87268 | 1687 | 61786 | 96877 |
| 74407 | 8678 | 63876 | 42877 |
| 6879 | 6879 | 6899 | 8909 |
| 7689 | 1298 | 1887 | 1869 |

1 + 9
2 + 9
3 + 9
4 + 9

1. Bought
sheep at
9 +
Eddi
years of

A gentler
to each
eldest

A man s
the se
the an

(18)
369
463
167
686
276
147
483
18
14
6
8

TABLE.

| | | |
|--------------|--------------|---------------|
| $1 + 9 = 10$ | $5 + 9 = 14$ | $9 + 9 = 18$ |
| $2 + 9 = 11$ | $6 + 9 = 15$ | $10 + 9 = 19$ |
| $3 + 9 = 12$ | $7 + 9 = 16$ | $11 + 9 = 20$ |
| $4 + 9 = 13$ | $8 + 9 = 17$ | $12 + 9 = 21$ |

4, 2, 6.

nts, a line for
nts remainin

0 sheep, and
stock?

h for a carriage
whole cost?

1. Bought 3 cows at \$20 a head, 2 calves for \$7, and
sheep at \$9 a head; what did the whole cost?

2. $9 + 3$ times 9 = how many?

3. Eddie is now 2 years old; in what year will he be
years old?

(177)

(172)

A gentleman left to each of his three daughters \$1900,
to each of his two younger sons \$2500, and to his
eldest son \$4000, how much did he leave to all?

(178)

A man sold 3 loads of hay, the first weighing 1670 lbs.,
the second 890 lbs., the third 1720 lbs.; what was
the amount sold?

(179)

$76879 + 9$ times itself = how many?

(176)

(180)

(181)

(182)

(183)

8767
8710
7710
8768
18768
78768
78768
96877
42877
8909
1869

369878
463786
167362
686746
276386
147368
483769
19867
14789
68796
86378

867964
789687
710974
270867
168734
687368
178697
896879
876897
786786
368789

878996
819796
109368
8697
7687
7867
6873
786
689
798
689

108796
108796
108796
8796
8796
8796
8796
8796
8796
8796
8796

1. Add 9's to 100;—commencing with 11.
2. What is the cost of 9 pairs of shoes at \$2 a pair.
3. Find by addition the number of peas in 5 pods each containing 9 peas.
4. How many are $19 + 9 + 9 + 9 + 9 + 9 + 9 + 9$

(184)

Bought a farm for \$2368, and sold it again so as to gain \$400; what did I sell the farm for?

(185)

Find the sum of $48763 + 86270 + 4687 + 578 + 49$
 $+ 18709 + 70471$.

(186)

Find the sum of $46537 + 54263 + 43986 + 5069 + 8$
 $+ 641 + 98076 + 7362 + 689 + 1907$.

(187)

Add together 587, 9658, 67, 431, 28670, 100000, 6300
 851, 8798, and $389476 + 7198 + 87968978$.

(188)

Find the value of $\$8635 + \$2194 + \$7421 + \93
 $+ \$5063 + \$135 + \$2196 + \$89 + \$1225 + \16 .

(189)

Borrowed from A. \$735, from B. \$634, and from C. as
 much as from the other two, how much did I borrow
 in all?

(190)

A man distributed money among his children as follows;
 \$700 to each of his three daughters, and to his son a
 sum equal to that of all his sisters; how much did he
 give to all?

TABLE.

| | | |
|---------------|----------------|----------------|
| $9 + 10 = 11$ | $9 + 10 = 19$ | $11 + 5 = 16$ |
| $+ 10 = 12$ | $10 + 11 = 21$ | $11 + 6 = 17$ |
| $+ 10 = 13$ | $11 + 11 = 22$ | $11 + 7 = 18$ |
| $+ 10 = 14$ | $12 + 11 = 23$ | $11 + 8 = 19$ |
| $+ 10 = 15$ | $11 + 1 = 12$ | $11 + 9 = 20$ |
| $+ 10 = 16$ | $11 + 2 = 13$ | $11 + 10 = 21$ |
| $+ 10 = 17$ | $11 + 3 = 14$ | $11 + 11 = 22$ |
| $+ 10 = 18$ | $11 + 4 = 15$ | $11 + 12 = 23$ |

Count 10's to 100;—commencing with 5.

Count 11's to 100;—commencing with 1.

$10 + 3$ times itself = what number?

(191)

A man sold 800 bushels of wheat for \$275, 175 bushels of oats for \$89, 250 bushels of corn for \$198, and 75 bushels of barley for \$50; how many bushels of grain did he sell, and how much did he receive for the whole?

(192)

Four hogs which weighed on an average four hundred and seventy-nine pounds each; what did the whole weigh?

(193)

Find the amount of $526794256 + 679362080 + 17736 + 368428 + 9570572 + 72576158 + 973826475 + 596284083 + 987654321$.

(194)

Find the value of $34763450 + 56871936 + 12345678 + 93648752 + 7494675 + 985421 + 67891 + 72936428 + 29368 + 1096 + 7898 + 179389 + 7198768 + 6879 + 69876 + 7690$.

TABLE.

| | | |
|---------------|---------------|----------------|
| $1 + 12 = 13$ | $5 + 12 = 17$ | $9 + 12 = 21$ |
| $2 + 12 = 14$ | $6 + 12 = 18$ | $10 + 12 = 22$ |
| $3 + 12 = 15$ | $7 + 12 = 19$ | $11 + 12 = 23$ |
| $4 + 12 = 16$ | $8 + 12 = 20$ | $12 + 12 = 24$ |

1. Add 12's to 100;—commencing with 6.
2. What is the cost of 12 articles at 1 penny each?
3. $50 + 35 + 15 =$ how many? (Here add the tens and units separately thus, 50—80—85—95—100, the sum).
4. How many are $70 + 80 + 9?$ — $35 + 61?$ — $20 + 48 + 32?$ — $79 + 79?$

(195)

Find the value of $82893 + 45 + 817526 + 456 + 4268$
 $+ 7676 + 96734 + 124735869 + 3749286.$

(196)

Find the value of $9482 + 39867 + 29479 + 4892$
 $+ 9276 + 850 + 5273 + 98 + 7000 + 80072 + 19$
 $+ 8467.$

(197)

Find the value of $978 + 749 + 4764 + 8967 + 94623$
 $+ 45237 + 77592 + 59286 + 89294 + 3789 + 2936$
 $+ 5700 + 619 + 378 + 9168 + 79 + 6899.$

(198)

The fore quarters of an ox weigh 108 pounds each, the hind quarters 124 pounds each, the hide 76 pounds, and the tallow 60 pounds; what is the weight of the whole ox?

(199)

A man paid 95 dollars for a horse, the same sum for a harness, and for a carriage as much as for both; what did the whole cost?

$$\begin{array}{l} 9 + 12 = 21 \\ 0 + 12 = 22 \\ 1 + 12 = 23 \\ 2 + 12 = 24 \end{array}$$

ith 6.
1 penny each
ere add the ten
-95-100, th

$$-35 + 61 ?$$

$$+ 456 + 4268$$

$$9479 + 4892$$

$$\begin{array}{l} 8967 + 94623 \\ 3789 + 2936 \\ 899. \end{array}$$

ds each, the
e 76 pounds,
eight of the

sum for a
for both;

3. The number of one order that makes one of the next higher, is called a *ratio*.

When the same ratio applies to all the orders it is called a *common ratio*. Thus, 10 is the common ratio of simple numbers.

The system of numbers of which ten is the common ratio is called the *decimal system*.

Before leaving addition, the pupil should be able to add columns of figures without any hesitation, and give the order and period of the sum of each column.

(200)

Find the value of $6379 + 6947 + 8476 + 8476 + 4736$.

OPERATION.—We write the numbers units under units, tens under tens, &c., (because units of different orders can not be added together, e. g. 6 units and 5 tens would neither be 11 units nor 11 tens); commencing at the right hand, 6—12—18—25—34 units = 3 tens and 4 units; set down the 4 units under the units, and carry the 3 tens to the column of tens; 3—6—13—20—24—31 tens = 3 hundreds and 1 ten, set down the 1 ten and carry the 3 hundreds to their proper column; 3—10—14—18—27—30 hundreds = 3 thousand and no hundreds; set down 0 and carry 3 thousand to the thousands' column; 3, 7, 15, 23, 29, 35 thousand = 3 tens of thousands and 5 thousand, both of which we set down; the sum is thirty-five thousand and fourteen.

(201)

Find the value of $36850 + 43476 + 18964 + 62840 + 71500 + 68400 + 1760 + 71680 + 376809 + 16890 + 7689 + 3796 + 19736 + 468 + 1678 + 3800 + 76890 + 768$.

1. What are the first six periods of notation ?
2. What are the orders of each period ?
3. How many units of one order make one of the next higher ?
4. How many units make one ten ? tens one hundred ?
5. 65 units = how many tens ? 1000 units = how many tens ? — hundreds ?

(202)

There are four numbers: the first, 316; the second, 17 more than the first; the third, 429 more than the second; the fourth, as much as the first and third added together; what is the sum of the four numbers?

(203)

Find the value of $1926 + 39257 + 3834 + 92751 + 92503 + 6846 + 649 + 867 + 34935 + 2679 + 7934 + 268 + 674 + 39487$.

(204)

Find the sum of one thousand and ninety, one million and eight, and ten thousand.

(205)

The population of Quebec is 62,140, of Three Rivers 6,000, Montreal 125,000, Ottawa 14,754, Kingston 13,884, Toronto 44,425, Hamilton 19,200, and London 11,581; what is the aggregate population of these eight cities ?

(206)

Find the sum of ten thousand, seventy millions seventy thousand and seventy, sixty-three millions seventeen hundred thousand, twenty-five thousand and twenty-five, thirty thousand, fifty millions and ninety, twenty thousand and ten, seventeen billions, four millions and six.

ADDITION OF THE DECIMAL CURRENCY. 27

The decimal currency differs from simple numbers having two denominations, viz. dollars and cents, and has the same common ratio, and may be taught in connection with simple numbers.

To add dollars and cents,

RULE.—Write the numbers with the decimal points in the same vertical column, and add as in simple numbers, observing to place the decimal point in the sum directly beneath those above.

\$2.25 + \$3.50 = how much?

30 cts. + 40 cts. + 19 cts. + 99 cts. + 18 cts.

+ 1 cts. = how much?

A lady paid for a mantle \$12.00, a dress \$10.50, a hat \$2.50, gaiters \$3.00, gloves \$1.50; what was the amount of her bill?

| (1) | (2) | (3) | (4) |
|---------|----------|----------|----------|
| \$72.37 | \$128.97 | \$287.91 | \$184.72 |
| 78.99 | 54.73 | 416.38 | 37.94 |
| 47.36 | 165.94 | 478.45 | 76.48 |
| 79.90 | 756.38 | 732.61 | 73.92 |
| 46.37 | 418.99 | 419.80 | 16.78 |
| 25.80 | 718.55 | 968.78 | 98.76 |
| 87.68 | 867.66 | 368.90 | 17.98 |
| 99.77 | 479.90 | 87.66 | 54.77 |
| 19.78 | 89.78 | 76.88 | 167.90 |
| 88.73 | 66.89 | 19.72 | 716.87 |
| 68.47 | 977.90 | 9.87 | 748.76 |
| 90.70 | 689.00 | .01 | 870.99 |

(5)

Find the amount of \$76.30 + \$768 + \$8649 + \$783.83 + \$987.40 + \$8767.94 + \$3849.39 + \$9878.44 + \$876.80 + \$799.36 + \$376.88.

28 ADDITION OF THE DECIMAL CURRENCY.

1. How does the decimal currency resemble simple numbers?

2. How does it differ from simple numbers?

3. What is the common ratio of simple numbers and dollars and cents?

4. Why must the addends be written with units the same order under each other?

5. How are dollars and cents added?

6. 70 cts. + 35 cts. + 42 cts. + 5 cts. + 85 cts. + 95 cts. + 10 dollars = how much?

(6)

Find the sum of \$58.75, \$11.27, \$71.43, \$91, \$41.87, \$77.58, \$0.64, \$30.72, \$95.60, \$189.12, \$198.15.

(7)

A man sold 350 bushels of wheat for \$490, 720 bushels of oats for \$129.50, 75 bushels of beans for \$93.75, 130 bushels of peas for \$95.50, 50 bushels of barley for \$42.75; how many bushels of grains did he sell and how much did he receive for the whole?

(8)

A man left \$1250 to each of his three daughters, to his son, a sum equal to two of his daughters; how much did he leave them?

(9)

A merchant's cash sales in one week amounted one day with another to \$231.16 per day; what was the week's receipts?

(10)

A farmer paid \$75.41 for a horse, \$54.04 for a yoke of oxen, \$21.00 a piece for two cows, \$7.41 each for three sheep, and \$10.21 for three pigs; what did they all amount to?

A lady paid 50 cents for cambric, 35 cents for
on, and 16 cents for thread; what did she pay for all?

$17 + 25 =$ how many? — $45 + 75 =$ 84

$1 + 32 =$ 72 + 32 + 14?

REVIEW.

1. What is arithmetic? 1.

2. What is a number? 2.

3. What is a unit? 3.

4. What is an *abstract* number? — a *simple*
number? 4. 5.

5. What is Notation?—Numeration? 6.

6. What are the characters used in expressing num-
bers? 7.

7. How does the position of a figure affect its value? 8.

8. In what ratio do the orders increase and diminish? 8.

9. What is the effect of removing a figure one place
to the right or left?

10. What are the orders of each period? 9.

11. Name the first six periods;—backwards.

12. What are the four fundamental rules of arith-
metic? 10.

13. What is addition?—simple addition? 11. 13.

14. What are the numbers to be added, and the result
of the addition called?

15. How are the addends written to be added?—Why?

16. Why do you carry for ten? 8.

17. How do you prove addition? 15.

18. How do dollars and cents resemble simple
numbers? 17.

19. What is the Decimal system of numbers? 16.

20. How are dollars and cents added? 17.

SUBTRACTION.

EXAMPLE 1.—James had 2 marbles and he gave John; how many had he left? 1 from 2 leaves many?

2. Emma had 4 roses and she gave 1 to Jane, and to Julia; how many had she left?

3. Charles had 5 cents, and he paid 2 cents for a book; how many cents had he left?

SOLUTION.—He had the difference between 5 cents and 2 cents; 2 cents from 5 cents leave 3 cents. Therefore he had 3 cents left.

NOTE.—The teacher should illustrate by means of visible objects the process of taking one number from another.

18. The process of finding the difference between two numbers is called subtraction.

The greater number is called the *minuend*, the less the *subtrahend*, and the number found the difference or remainder.

19. The sign —, called *minus*, denotes subtraction; thus, $8 - 3 = 5$, denotes that 3 is to be subtracted from 8, and is read 8 minus 3 equal 5.

1. Count from 50 backwards to 1—from 100.

2. Take two successively from 50: thus, 50, 48, 46, &c.

TABLE.

| | | |
|-------------|--------------|---------------|
| $3 - 2 = 1$ | $7 - 2 = 5$ | $11 - 2 = 9$ |
| $4 - 2 = 2$ | $8 - 2 = 6$ | $12 - 2 = 10$ |
| $5 - 2 = 3$ | $9 - 2 = 7$ | $13 - 2 = 11$ |
| $6 - 2 = 4$ | $10 - 2 = 8$ | $14 - 2 = 12$ |

To subtract simple numbers,

EXAMPLE.—Find the difference between 2091 and 147.

OPERATION.—Commencing at the right hand, we cannot take 7 units from 1 unit, we borrow from 9 tens 1 = 10 units, $10 + 1 = 11$, 7 from 11 leave 4, which we set down beneath the figures subtracted; then $4 + 1$ (the 1 borrowed) from 9 leave 4; 1 from 0 we cannot; borrow from 2, $1 = 10$ of that order, 1 from 10 leaves 9; 1 (carried) from 2 leaves 1.

RULE.—Write the subtrahend under the minuend so that units of the same order may stand under each other, as in addition. Commence at the right hand, and subtract each figure of the subtrahend from the one above it, setting down the remainder under the figure subtracted. If any figure of the subtrahend be greater than the corresponding figure of the minuend, borrow 1 of the next higher order of the minuend, add it as 10 to the upper figure and subtract as before, observing to carry the 1 borrowed to the next figure of the subtrahend; (which is thus subtracted from the figure of the minuend from which it was taken).

21. PROOF.—Add the difference to the subtrahend; the sum should be equal to the minuend.

| (1) | (2) | (3) | (4) |
|--------|--------|--------|--------|
| 726384 | 371680 | 328768 | 468926 |
| 312162 | 240120 | 121232 | 125612 |
| <hr/> | <hr/> | <hr/> | <hr/> |

1. Count 2's to 100 and backwards;—comment with 1.

2. A class in arithmetic contained 12 girls and boys; how many more girls than boys in the class?

3. Charles had 10 marbles and he gave 2 to Co and 2 to Frank; how many had he left?

| | (5) | (6) | (7) | (8) |
|------|--------|--------|--------|--------|
| Min. | 376210 | 143214 | 132103 | 310890 |
| Sub. | 221032 | 37824 | 24322 | 102629 |

Dif. 155178

| | (10) | (11) | (12) |
|--------|--------|--------|--------|
| Proof. | 376210 | 646723 | 632069 |
| | | 222222 | 152836 |

| (13) | (14) | (15) | (16) |
|---------|---------|--------|--------|
| 3210362 | 3462046 | 102144 | 142110 |
| 1123141 | 1217822 | 23124 | 101232 |

| (17) | (18) | (19) | (20) |
|---------|---------|--------|--------|
| 7105198 | 7149902 | 316913 | 321896 |
| 2123126 | 432129 | 186412 | 161833 |

| (21) | (22) | (23) | (24) |
|---------|--------|--------|-------|
| 6131021 | 102132 | 100211 | 63210 |
| 4714214 | 14321 | 20423 | 14341 |

| (25) | (26) | (27) | (28) |
|---------|--------|--------|--------|
| 2921023 | 321021 | 102110 | 448200 |
| 2311224 | 41234 | 12312 | 12325 |

4 — 3 =
5 — 3 =
6 — 3 =
7 — 3 =

Count t
Leslie t
a ball
in?
How m
3? 15

(29)
28914
61232

(33)
87210
34723

(37)
17149
12843

(41)
3103
1934

(4)
4793
1762

TABLE.

| | | |
|-----------|------------|-------------|
| 4 — 3 = 1 | 8 — 3 = 5 | 12 — 3 = 9 |
| 5 — 3 = 2 | 9 — 3 = 6 | 13 — 3 = 10 |
| 6 — 3 = 3 | 10 — 3 = 7 | 14 — 3 = 11 |
| 7 — 3 = 4 | 11 — 3 = 8 | 15 — 3 = 12 |

Count threes to 100 and backwards.

Leslie bought a whistle for 3 cents, and exchanged a ball which he sold for 5 cents; how much did he have left?

How many are 8 — 3? 7 — 3? 12 — 3? 6 — 3? 15 — 3?

(8)

310890
102629

(12)

632569
172836

(16)

142110
101232

(20)

321896
161833

(24)

63210
14341

(28)

448200
12325

(29)

28914
61232

(30)

219786
191623

(31)

468907
208663

(32)

910261
123486

(33)

87210
134723

(34)

406372
133323

(35)

210321
112323

(36)

672104
436843

(37)

171493
128436

(38)

639686
364663

(39)

290398
87288

(40)

310769
245433

(41)

310376
193436

(42)

187265
123923

(43)

910714
616283

(44)

194567
163246

(45)

479326
176243

(46)

109371
81933

(47)

519231
153823

(48)

410213
144126

TABLE.

| | | |
|-------------|--------------|---------------|
| $5 - 4 = 1$ | $9 - 4 = 5$ | $13 - 4 = 9$ |
| $6 - 4 = 2$ | $10 - 4 = 6$ | $14 - 4 = 10$ |
| $7 - 4 = 3$ | $11 - 4 = 7$ | $15 - 4 = 11$ |
| $8 - 4 = 4$ | $12 - 4 = 8$ | $16 - 4 = 12$ |

1. What does subtraction teach ?
2. Emma is 9 years old and Charles 12, what is the difference in their ages ?
3. Count 4's to 50 and backwards;—to 100.
4. $27 - 4 - 4 - 4 - 4 - 4 - 4 =$ how many ?

| | | | |
|--------|--------|--------|--------|
| (49) | (50) | (51) | (52) |
| 114126 | 721043 | 371021 | 471021 |
| 32142 | 164212 | 112634 | 101234 |
| <hr/> | <hr/> | <hr/> | <hr/> |

| | | | |
|--------|--------|--------|--------|
| (53) | (54) | (55) | (56) |
| 612149 | 710982 | 102103 | 310214 |
| 144324 | 144341 | 41424 | 13234 |
| <hr/> | <hr/> | <hr/> | <hr/> |

| | | | |
|--------|--------|--------|--------|
| (57) | (58) | (59) | (60) |
| 371021 | 347191 | 372104 | 321072 |
| 123414 | 116234 | 141423 | 21441 |
| <hr/> | <hr/> | <hr/> | <hr/> |

| | | | |
|--------|--------|--------|--------|
| (61) | (62) | (63) | (64) |
| 241327 | 362192 | 707268 | 102134 |
| 42341 | 142341 | 42642 | 42345 |
| <hr/> | <hr/> | <hr/> | <hr/> |

| | | | |
|--------|--------|--------|---------|
| (65) | (66) | (67) | (68) |
| 768278 | 360792 | 807368 | 8910726 |
| 654245 | 146540 | 436434 | 4163451 |
| <hr/> | <hr/> | <hr/> | <hr/> |

SUBTRACTION.

35

TABLE.

| | | |
|-------------|--------------|---------------|
| $6 - 5 = 1$ | $10 - 5 = 5$ | $14 - 5 = 9$ |
| $7 - 5 = 2$ | $11 - 5 = 6$ | $15 - 5 = 10$ |
| $8 - 5 = 3$ | $12 - 5 = 7$ | $16 - 5 = 11$ |
| $9 - 5 = 4$ | $13 - 5 = 8$ | $17 - 5 = 12$ |

1. What is subtraction ?
2. In example 59, which is the subtrahend?—
minuend?—difference?
3. Count 5's to 100 and backwards;—commencing
with 3.

| | | | |
|--------|--------|--------|--------|
| (69) | (70) | (71) | (72) |
| 673678 | 363791 | 788709 | 710878 |
| 147634 | 143645 | 745637 | 555564 |
| <hr/> | <hr/> | <hr/> | <hr/> |

| | | | |
|--------|--------|--------|--------|
| (73) | (74) | (75) | (76) |
| 371072 | 632637 | 916809 | 309072 |
| 157346 | 555414 | 601236 | 134465 |
| <hr/> | <hr/> | <hr/> | <hr/> |

| | | | |
|--------|--------|--------|--------|
| (77) | (78) | (79) | (80) |
| 671073 | 680736 | 607368 | 621073 |
| 365586 | 836458 | 46345 | 146704 |
| <hr/> | <hr/> | <hr/> | <hr/> |

| | | | |
|--------|--------|--------|---------|
| (81) | (82) | (83) | (84) |
| 687369 | 710767 | 102632 | 7102109 |
| 645326 | 136452 | 45361 | 126354 |
| <hr/> | <hr/> | <hr/> | <hr/> |

| | | | |
|--------|--------|--------|--------|
| (85) | (86) | (87) | (88) |
| 132104 | 687001 | 367204 | 109456 |
| 43645 | 166524 | 36456 | 64364 |
| <hr/> | <hr/> | <hr/> | <hr/> |

TABLE.

| | | |
|--------------|--------------|---------------|
| $7 - 6 = 1$ | $11 - 6 = 5$ | $15 - 6 = 9$ |
| $8 - 6 = 2$ | $12 - 6 = 6$ | $16 - 6 = 10$ |
| $9 - 6 = 3$ | $13 - 6 = 7$ | $17 - 6 = 11$ |
| $10 - 6 = 4$ | $14 - 6 = 8$ | $18 - 6 = 12$ |

1. Count 6's to 72 and backwards.
2. $37 - 6 - 6 - 6 - 6 - 6 =$ how many ?
3. Charles had 9 cents, and he paid 4 cents for paper, and 5 cents for a slate ; how much had he left ?

| | | | |
|--------|--------|--------|--------|
| (89) | (90) | (91) | (92) |
| 710423 | 360210 | 402916 | 410072 |
| 66455 | 156456 | 132465 | 140201 |
| <hr/> | <hr/> | <hr/> | <hr/> |

| | | | |
|--------|--------|--------|--------|
| (93) | (94) | (95) | (96) |
| 302641 | 703260 | 106200 | 403621 |
| 103265 | 86346 | 61203 | 117654 |
| <hr/> | <hr/> | <hr/> | <hr/> |

| | | | |
|---------|--------|--------|--------|
| (97) | (98) | (99) | (100) |
| 1321072 | 329073 | 182032 | 706327 |
| 1421326 | 42674 | 40274 | 23764 |
| <hr/> | <hr/> | <hr/> | <hr/> |

| | | | |
|--------|--------|--------|--------|
| (101) | (102) | (103) | (104) |
| 107210 | 810710 | 435672 | 100200 |
| 62774 | 107670 | 58074 | 90290 |
| <hr/> | <hr/> | <hr/> | <hr/> |

| | | | |
|--------|--------|--------|--------|
| (105) | (106) | (107) | (108) |
| 721072 | 360721 | 360721 | 320101 |
| 101296 | 70864 | 101764 | 120102 |
| <hr/> | <hr/> | <hr/> | <hr/> |

SUBTRACTION.

37

TABLE.

| | | |
|--------------|--------------|---------------|
| $8 - 7 = 1$ | $12 - 7 = 5$ | $16 - 7 = 9$ |
| $9 - 7 = 2$ | $13 - 7 = 6$ | $17 - 7 = 10$ |
| $10 - 7 = 3$ | $14 - 7 = 7$ | $18 - 7 = 11$ |
| $11 - 7 = 4$ | $15 - 7 = 8$ | $19 - 7 = 12$ |

1. What is subtraction ?
2. What is the minuend?—subtrahend?—difference ?
3. Count sevens to 70 and backwards.
4. $50 - 7 - 7 - 7 - 7 - 7 - 7 - 7 =$ how many ?

(109)

Find the difference between 1890 and 809.

(110)

From 1690021, take 190165.

| | | | |
|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------------------|
| (111) 730726 416724 <hr/> | (112) 709261 12634 <hr/> | (113) 710736 76376 <hr/> | (114) 109256 54674 <hr/> |
| (115) 327107 147648 <hr/> | (116) 3210213 487648 <hr/> | (117) 3010321 777778 <hr/> | (118) 103210 18881 <hr/> |
| (119) 3721021 761764 <hr/> | (120) 100001 10002 <hr/> | (121) 301809 18877 <hr/> | (222) 371021 9887 <hr/> |
| (123) 3121032 147718 <hr/> | (124) 3121881 861788 <hr/> | (125) 310214 136784 <hr/> | (126) 146000 86908 <hr/> |

TABLE.

| | | |
|--------------|--------------|---------------|
| $9 - 8 = 1$ | $13 - 8 = 5$ | $17 - 8 = 9$ |
| $10 - 8 = 2$ | $14 - 8 = 6$ | $18 - 8 = 10$ |
| $11 - 8 = 3$ | $15 - 8 = 7$ | $19 - 8 = 11$ |
| $12 - 8 = 4$ | $16 - 8 = 8$ | $20 - 8 = 12$ |

1. How do you prove subtraction ?
2. What number added to the subtrahend will give the minuend ?
3. What number added to 16 will make 24 ?
 SOLUTION.—The difference between two numbers added to the less will give the greater ; $24 - 16 = 8$: therefore 8 added to 16 will make 24.
4. What number added to 8 will give 16 ? 18 ? 20 ? 30 ? 40 ? 100 ?
5. Count 8's to 72 and backwards.

(127)

A man had 215 sheep, and sold 57 of them ; how many had he left ?

(128)

Find the value of $76897 - 687 - 6937$.

(129)

What number added to 1673012 will make 371020243 ?

(130)

Find the value of $7638 + 376 - 172 - 400 + 7321 - 372 - 18$.

(131)

A merchant had 2068 yards of cloth ; he sold on Monday 129 yards, on Tuesday 97 yards, on Wednesday 308 yards, on Thursday 92 yards, on Friday 78 yards, on Saturday 120 yards ; how many yards had he remaining ?

TABLE.

| | | |
|------------|------------|-------------|
| 10 — 9 = 1 | 14 — 9 = 5 | 18 — 9 = 9 |
| 11 — 9 = 2 | 15 — 9 = 6 | 19 — 9 = 10 |
| 12 — 9 = 3 | 16 — 9 = 7 | 20 — 9 = 11 |
| 13 — 9 = 4 | 17 — 9 = 8 | 21 — 9 = 12 |

1. Count 9's to 100, and backwards.
2. $58 - 9 - 9 - 9 - 9 - 9$;—how many?
3. Emma is 9 years old; in what year was she born?

(132)

From 70080093000 take 1630032004.

(133)

How much does 784000 exceed twice 193049?

(134)

From 1 billion, take 1 million.

(135)

From twice 7063879, take 806767 — 7600.

(136)

A house and lot are valued at \$1850; the house is worth \$960; what is the value of the lot?

(137)

4 loads of oats weighed together 6673 pounds; the two first loads weighed 1190 pounds each, the third 2350 pounds; what did the fourth load weigh?

(138)

167261
— 17264
— 46324
— 71062
— 147

(139)

872109
— 4763
— 2164
— 1472
— 16821

(140)

9021631
— 612786
— 417268
— 7689
— 7167

(141)

1247683
— 186176
— 472168
— 3614
— 18710

TABLE.

| | | |
|-------------|--------------|--------------|
| 11 — 10 = 1 | 19 — 10 = 9 | 16 — 11 = 5 |
| 12 — 10 = 2 | 20 — 10 = 10 | 17 — 11 = 6 |
| 13 — 10 = 3 | 21 — 10 = 11 | 18 — 11 = 7 |
| 14 — 10 = 4 | 22 — 10 = 12 | 19 — 11 = 8 |
| 15 — 10 = 5 | 12 — 11 = 1 | 20 — 11 = 9 |
| 16 — 10 = 6 | 13 — 11 = 2 | 21 — 11 = 10 |
| 17 — 10 = 7 | 14 — 11 = 3 | 22 — 11 = 11 |
| 18 — 10 = 8 | 15 — 11 = 4 | 23 — 11 = 12 |

1. A man bought a horse for \$100, and 3 cows at \$20 a head; how much more did the horse cost than the cows?

2. How many are $75 - 22 - 30 - 9$?

3. Count 10's and 11's to 100 and backwards;—commencing with 5.

(142)

If 1708 be minuend and 968 the subtrahend, what is the difference?

(143)

If the difference between two numbers be 740, and the subtrahend 968, what is the minuend?

(144)

A merchant was owing \$5000; he paid at different times the sums of \$350, \$970, and \$2008; how much is yet owing?

(145)

A man sold a farm for \$2000, which was \$910 more than he paid for it; how much did he pay for it?

(146)

A man paid \$85 for a horse, \$150 for a harness, and for carriage as much as for horse and harness lacking \$25; he then sold the whole for \$415, did he lose or gain by the bargain, and how much?

TABLE.

| | | |
|-------------|-------------|--------------|
| 13 — 12 = 1 | 17 — 12 = 5 | 21 — 12 = 9 |
| 14 — 12 = 2 | 18 — 12 = 6 | 22 — 12 = 10 |
| 15 — 12 = 3 | 19 — 12 = 7 | 23 — 12 = 11 |
| 16 — 12 = 4 | 20 — 12 = 8 | 24 — 12 = 12 |

1. Count 12's to 100 and backwards.

2. The sum of two numbers is 300, the less number is 120, what is the greater number ?

3. The sum of two numbers is 300, and the greater number 180, what is the less number ?

(147)

The sum of two numbers is 19768, and the greater number 12769 ; what is the less number ?

(148)

The less of two numbers is 6999, and their sum 19768 ; what is the greater number ?

(149)

If 879687 be subtrahend, and 4687 the difference, what is the minuend ?

(150)

If 884374 be minuend, and 4687 the difference, what is the subtrahend ?

(151)

What number together with these three, viz. 125, 34, and 970, will make 1800 ?

(152)

A man sold 3 beeves at \$35 each, pork to the amount of \$125, and flour for \$84. He received in pay, salt at \$15, sugar at \$21, tea at \$19, cloth to the amount of \$80, and the balance in cash ; how much cash did he receive ?

1. The minuend — the subtrahend = what?
2. The subtrahend + the difference = what?
3. 800 is the subtrahend, and 200 the difference; what is the minuend?
4. 1000 is the minuend, and 200 the difference; what is the subtrahend?
5. 1000 is the minuend, and 800 the subtrahend; what is the difference?

(153)

How long since America was discovered in 1492?

(154)

Sir Isaac Newton was born in the year 1642; how long is it since?

(155)

Mont Blanc, the highest mountain in Europe, is 15680 feet above the level of the ocean, and Chimborazo in America is 21000 feet; what is the difference in the height of these two mountains?

(156)

The area of the earth's surface is about 200 millions square miles; of this nearly 60 millions are land, how much is water?

(157)

The subtrahend is 1390, the difference 1690; what is the minuend?

(158)

British America contains about 2,525,994 square miles, of which Upper Canada contains 180,090, Lower Canada 210,000, New Brunswick 27,710, Nova Scotia 19,650, Prince Edward Island 2,134, Newfoundland 57,000, British Columbia 213,500, Vancouver Island 16,000 square miles, and the Hudson Bay Territory the remainder; what is its area?

SUBTRACTION OF THE DECIMAL CURRENCY. 43

22. RULE.—Write the numbers with the decimal points under each other, and subtract as in simple numbers. Place the point in the answer directly beneath those above.

1. A man bought a horse for \$75, and sold him again for \$89.50; what did he gain by the transaction?

2. A lady purchased a parasol at \$2, a pair of gloves at \$1.20; she paid a \$5 bill; how much change did she receive back?

3. $\$5 - 5 \text{ cents} =$ how much?

OPERATION.— $\$5.00$
 $\underline{.05}$

$\$4.95$ difference.

(1)

Find the value of $\$167.01 - \68.09 .

(2)

What sum added to $\$15.09$ will make $\$20$?

(3)

How much does $\$8767.08$ exceed $\$6298.20$?

(4)

Find the value of $\$17894.37 - \$123.71 - \$298.67 - \$143.71 - \$31.98$.

(5)

Find the value of $\$3142.67 - \$2.67 + \$4171 - \0.66 .

(6)

A man borrowed \$767, and paid at different times \$125.25, and \$356.80; how much does he yet owe?

(7)

A man sold a load of grain for \$40; he took in pay a plough at \$14.90, 3 hoes at 60 cents each, 4 rakes at 22 cents, a pitchfork at \$1.19, and a spade at 95 cents; how much was yet coming to him?

44 SUBTRACTION OF THE DECIMAL CURRENCY.

1. How are dollars and cents subtracted?

2. John bought a sled for 75 cents, and gave 24 cents to have it repaired; he then sold it for \$1, how much did he make by the bargain?

3. William Mills bought a colt at \$25, and sold it a year after for twice what it cost him, lacking \$6; what did he make by the bargain, allowing \$10 for his keeping?

(8)

A man sold a farm for \$7697, which was \$1761.50 more than he paid for it; what did he give for the farm?

(9)

A merchant has \$2760 in the bank, \$16773 in stock, \$17694 due him, and owes \$7693.50; what is he worth?

(10)

A young lady went a shopping taking with her a \$20 bill. She purchased a dress at \$8.16, a muff at \$3.19, a bonnet at \$3.08, a pair of gloves at \$1.12, a pair of shoes for \$1.90, and a fan at 19 cents; how much money did she bring home?

REVIEW OF SUBTRACTION.

1. What is *subtraction*? 18.
2. What are the given terms of subtraction?
3. What is the term to be found?
4. What is the minuend?—subtrahend?
5. What is the difference or remainder?
6. The minuend — the subtrahend = what?
7. The subtrahend + the difference = what?
8. The minuend — the difference = what?
9. The sum of two numbers — the greater = what?
10. The sum of two numbers — the less = what?
11. How is subtraction proved? 21.
12. How are dollars and cents subtracted? 22.

MULTIPLICATION.

23. EXAMPLE.—Harry paid 1 cent for an apple; what will two apples cost at the same rate? 2 times 1 cent are how many cents?

2. What will 4 pencils cost at 1 cent each?

3. What cost 2 yards of cloth at \$3 a yard?

4. If 1 orange cost 5 cents, what will 3 oranges cost?

SOLUTION.—If 1 orange cost 5 cents, 3 oranges will cost 3 times 5 cents; 3 times 5 cents are 15 cents. Therefore three oranges will cost 15 cents.

In this example, 5 cents is added together three times; 5 cts. + 5 cts. + 5 cts. = 15 cts. Hence,

24. Multiplication is a short method of performing addition. Or,

Multiplication is the process of taking one number as many times as there are units in another.

The number to be multiplied is called the *multiplicand*, the number we multiply by is called the *multiplier*, and the result of the multiplication, the *product*.

25. In multiplication the multiplicand is added as many times as there are units in the multiplier.

1. Count 2 successively to 100;—commencing with 1.

TABLE.

| | | |
|-----------------|------------------|------------------|
| 2 times 1 are 2 | 2 times 5 are 10 | 2 times 9 are 18 |
| 2 " 2 " 4 | 2 " 6 " 12 | 2 " 10 " 20 |
| 2 " 3 " 6 | 2 " 7 " 14 | 2 " 11 " 22 |
| 2 " 4 " 8 | 2 " 8 " 16 | 2 " 12 " 24 |

26. To multiply by a number not exceeding 12,

EXAMPLE.—Multiply 6098 by 2.

OPERATION.—2 times 8 are 16, set down the 6 units and carry the 1 ten, as in addition; twice 9 are 18 and 1 carried are 19, set down 9 and carry 1; twice 0 is nothing, set down the 1 carried; twice 6 are 12, which set down in full.

RULE.—Write the multiplier beneath the multiplicand, and commencing at the right hand multiply each figure of the multiplicand by the multiplier, setting down the units, and carrying the tens, as in addition.

27. The sign \times , denotes multiplication, $7 \times 2 = 14$, is read 7 multiplied by 2 equal 14.

| | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|
| (1) 12132 2 —— | (2) 21022 2 —— | (3) 62102 2 —— | (4) 43202 2 —— |
| (5) 31032 2 —— | (6) 62148 2 —— | (7) 36504 2 —— | (8) 71079 2 —— |

TABLE.

| | | |
|---------------|----------------|--------------------|
| 3 times 1 = 3 | 3 times 5 = 15 | $3 \times 9 = 27$ |
| 3 " 2 = 6 | 3 " 6 = 18 | $3 \times 10 = 30$ |
| 3 " 3 = 9 | 3 " 7 = 21 | $3 \times 11 = 33$ |
| 3 " 4 = 12 | 3 " 8 = 24 | $3 \times 12 = 36$ |

1. What is the cost of 3 books at 6 cents each?

SOLUTION.—If 1 book cost 6 cents, 2 books will cost 3 times 6 cents; 3 times 6 cents are 18 cents. Therefore, 3 books will cost 18 cents.

NOTE.—The solution of similar questions should be given till the pupil is perfectly familiar with the principle involved.

2. What will 3 yards of cloth cost at 11 cts. a yard?

3. Add threes to 100;—commencing with 5; 7.

4. How many are 3×10 ?— 10×3 ; $30 =$ how many 3's?—how many 10's?

| | | | |
|---------------------|---------------------|---------------------|---------------------|
| (9) 786133 3 | (10) 768736 3 | (11) 610079 3 | (12) 196789 3 |
| (13) 760763 3 | (14) 160736 3 | (15) 760973 3 | (16) 928760 3 |
| (17) 689764 3 | (18) 690077 3 | (19) 80768 3 | (20) 148902 3 |
| (21) 163274 3 | (22) 642009 2 | (23) 104725 3 | (24) 873256 2 |

TABLE.

| | | |
|-----------------|------------------|--------------------|
| 4 times 1 are 4 | 4 times 5 are 20 | $4 \times 9 = 36$ |
| 4 " 2 " 8 | 4 " 6 " 24 | $4 \times 10 = 40$ |
| 4 " 3 " 12 | 4 " 7 " 28 | $4 \times 11 = 44$ |
| 4 " 4 " 16 | 4 " 8 " 32 | $4 \times 12 = 48$ |

28. To prove multiplication, cast the nines from the multiplicand, and from the multiplier; multiply the two remainders together and cast the nines from their product. Lastly, cast out the nines of the product, and the two last remainders, if the work is correct, will be equal.

EXAMPLE.—Multiply 48124 by 3.

Commencing at the right of the multiplicand 4 and 2 are 6 and 1 are 7 and 2 (from 8) are 9, which cast away. 6 and 3 (from 4) make 9 and 1 left, which write at the left of the sign. 3 being less than 9 is written at the right then 3 times 1 = 3, which we write above the sign. Of the product 2 and 7 are 9; 3 and 4 and 2 (from 4) are 9; leaving 3 which is written below the sign, and being equal to the last remainder, the work is supposed to be correct.

$$\begin{array}{r} 48124 \\ \times 3 \\ \hline \end{array}$$

$$144372$$

$$\begin{array}{r} 3 \\ 1 \times 3 \\ \hline 3 \end{array}$$

$$\begin{array}{r} (25) \\ 730260 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} (26) \\ 212340 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} (27) \\ 167216 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} (28) \\ 721093 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} (29) \\ 376843 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} (30) \\ 168736 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} (31) \\ 716091 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} (32) \\ 768916 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} (33) \\ 763871 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} (34) \\ 600873 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} (35) \\ 807076 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} (36) \\ 281600 \\ \times 4 \\ \hline \end{array}$$

TABLE.

| |
|---------------|
| 5 times 1 = 5 |
| 5 " 2 = 10 |
| 5 " 3 = 15 |
| 5 " 4 = 20 |

| |
|----------------|
| 5 times 5 = 25 |
| 5 " 6 = 30 |
| 5 " 7 = 35 |
| 5 " 8 = 40 |

| |
|-------------|
| 9 × 5 = 45 |
| 10 × 5 = 50 |
| 11 × 5 = 55 |
| 12 × 5 = 60 |

1. What does multiplication teach?
2. Point out the multiplicand, multiplier, and product in ex. 37.
3. If a man can walk 4 miles an hour, how far can he walk in 6 hours?
4. Add 4's to 100;—commencing with 2,—1,—3.
5. Add 5's to 100;—commencing with 3,—2.
6. 4 times 8 = how many? How many 4's?—8's?

$$\begin{array}{r} (37) \\ 206721 \\ \underline{\quad 4 \quad} \end{array}$$

$$\begin{array}{r} (38) \\ 637210 \\ \underline{\quad 4 \quad} \end{array}$$

$$\begin{array}{r} (39) \\ 110723 \\ \underline{\quad 4 \quad} \end{array}$$

$$\begin{array}{r} (40) \\ 823465 \\ \underline{\quad 4 \quad} \end{array}$$

$$\begin{array}{r} (41) \\ 673789 \\ \underline{\quad 5 \quad} \end{array}$$

$$\begin{array}{r} (42) \\ 365076 \\ \underline{\quad 5 \quad} \end{array}$$

$$\begin{array}{r} (43) \\ 767908 \\ \underline{\quad 5 \quad} \end{array}$$

$$\begin{array}{r} (44) \\ 736554 \\ \underline{\quad 5 \quad} \end{array}$$

$$\begin{array}{r} (45) \\ 671099 \\ \underline{\quad 5 \quad} \end{array}$$

$$\begin{array}{r} (46) \\ 710877 \\ \underline{\quad 6 \quad} \end{array}$$

$$\begin{array}{r} (47) \\ 807836 \\ \underline{\quad 5 \quad} \end{array}$$

$$\begin{array}{r} (48) \\ 896708 \\ \underline{\quad 5 \quad} \end{array}$$

$$\begin{array}{r} (49) \\ 760734 \\ \underline{\quad 5 \quad} \end{array}$$

$$\begin{array}{r} (50) \\ 671076 \\ \underline{\quad 5 \quad} \end{array}$$

$$\begin{array}{r} (51) \\ 897687 \\ \underline{\quad 5 \quad} \end{array}$$

$$\begin{array}{r} (52) \\ 946589 \\ \underline{\quad 5 \quad} \end{array}$$

$$\begin{array}{r} (53) \\ 136276 \\ \underline{\quad 5 \quad} \end{array}$$

$$\begin{array}{r} (54) \\ 760736 \\ \underline{\quad 4 \quad} \end{array}$$

$$\begin{array}{r} (55) \\ 807326 \\ \underline{\quad 5 \quad} \end{array}$$

$$\begin{array}{r} (56) \\ 910731 \\ \underline{\quad 5 \quad} \end{array}$$

TABLE.

6 times 1 = 6

6 " 2 = 12

6 " 3 = 18

6 " 4 = 24

6 times 5 = 30

6 " 6 = 36

6 " 7 = 42

6 " 8 = 48

6 × 9 = 54

6 × 10 = 60

6 × 11 = 66

6 × 12 = 72

1. A man paid \$6 for a sheep, and 4 times as much for a cow; what did he pay for both?

2. Add 6's to 100 and backwards;—commencing with 3.

3. $6 \times 8 + 6 \times 5 =$ how many?

29. Perform multiplication or division indicated by signs before addition or subtraction.

$$\begin{array}{r} (57) \\ 710736 \\ \underline{6} \end{array}$$

$$\begin{array}{r} (58) \\ 873684 \\ \underline{6} \end{array}$$

$$\begin{array}{r} (59) \\ 766439 \\ \underline{6} \end{array}$$

$$\begin{array}{r} (60) \\ 871078 \\ \underline{6} \end{array}$$

$$\begin{array}{r} (61) \\ 876934 \\ \underline{5} \end{array}$$

$$\begin{array}{r} (62) \\ 897681 \\ \underline{4} \end{array}$$

$$\begin{array}{r} (63) \\ 807638 \\ \underline{6} \end{array}$$

$$\begin{array}{r} (64) \\ 87096 \\ \underline{6} \end{array}$$

$$\begin{array}{r} (65) \\ 235489 \\ \underline{6} \end{array}$$

$$\begin{array}{r} (66) \\ 973672 \\ \underline{6} \end{array}$$

$$\begin{array}{r} (67) \\ 367268 \\ \underline{6} \end{array}$$

$$\begin{array}{r} (68) \\ 876791 \\ \underline{6} \end{array}$$

$$\begin{array}{r} (69) \\ 786321 \\ \underline{5} \end{array}$$

$$\begin{array}{r} (70) \\ 190260 \\ \underline{4} \end{array}$$

$$\begin{array}{r} (71) \\ 716921 \\ \underline{6} \end{array}$$

$$\begin{array}{r} (72) \\ 3171091 \\ \underline{5} \end{array}$$

$$\begin{array}{r} (73) \\ 710687 \\ \underline{3} \end{array}$$

$$\begin{array}{r} (74) \\ 369217 \\ \underline{6} \end{array}$$

$$\begin{array}{r} (75) \\ 369214 \\ \underline{6} \end{array}$$

$$\begin{array}{r} (76) \\ 791896 \\ \underline{6} \end{array}$$

TABLE.

$$\begin{array}{l} 7 \text{ times } 1 = 7 \\ 7 \text{ " } 2 = 14 \\ 7 \text{ " } 3 = 21 \\ 7 \text{ " } 4 = 28 \end{array}$$

$$\begin{array}{l} 7 \text{ times } 5 = 35 \\ 7 \text{ " } 6 = 42 \\ 7 \text{ " } 7 = 49 \\ 7 \text{ " } 8 = 56 \end{array}$$

$$\begin{array}{l} 7 \times 9 = 63 \\ 7 \times 10 = 70 \\ 7 \times 11 = 77 \\ 7 \times 12 = 84 \end{array}$$

1. duct?
2. pound
what

3.
4.
5. —6

77. 68
78. 8
79. 3
80. 6
81. 6
82. 6

89. W
90. H

91. A

8 times
8 "
8 "
8 "

1. What is the multiplicand?—multiplier?—product?

2. Emma bought 5 pounds of soap at 7 cents a pound, and 6 pounds of starch at 10 cents a pound; what did she pay for all?

3. $7 + 6$ times itself = how many?

4. $7 \times 5 + 7 \times 6$ = how many?

5. Add 7's to 100;—commencing with 4,—2,—6,—3.

Find the value of,

77. 6873768×7 .

83. $37102 \times 6 \times 5 \times 2$.

78. 87600975×7 .

84. $71985 \times 7 \times 6 \times 5$.

79. 32109671×7 .

85. $89106 \times 6 \times 5 \times 7$.

80. 69678981×7 .

86. $8103 \times 2 \times 3 \times 4 \times 5$.

81. 67199676×7 .

87. $189 \times 4 \times 5 \times 6 \times 7$.

82. 6980779×7 .

88. $89 \times 7 + 180 \times 7$.

89. What cost 128 barrels of flour at \$7 a barrel?

90. How many yards of cloth in 6 pieces containing 57 yards each, and 7 pieces each containing 54 yards?

91. A house has 8 windows in front each containing 6 panes of glass, and 6 windows in the back containing 12 panes each; how many panes of glass does the house contain?

TABLE.

8 times 1 = 8

8 times 5 = 40

$8 \times 9 = 72$

8 " 2 = 16

8 " 6 = 48

$8 \times 10 = 80$

8 " 3 = 24

8 " 7 = 56

$8 \times 11 = 88$

8 " 4 = 32

8 " 8 = 64

$8 \times 12 = 96$

9 = 63

10 = 70

11 = 77

12 = 84

30. The multiplicand and multiplier are called the factors (i.e. producers) of the product.

1. 8 and 4 are the factors of what number ?
2. 2, 3, and 5, are the factors of what number ?
3. What are the factors of 24, 56, and 40 ?
4. Add 8's to 100;—commencing with 5,—2,
—6,—3,—7.

Find the value of,

- | | |
|--------------------------|---|
| 92. 8092637×8 . | 96. $91026 \times 2 \times 6 \times 8$. |
| 93. 7254368×8 . | 97. $987 \times 3 \times 4 \times 5 \times 8$. |
| 94. 7462344×8 . | 98. $98 \times 7 \times 8 + 389$. |
| 95. 7169779×8 . | 99. $8 \times 8 + 6 \times 8 + 7 \times 8$. |

100. Sold 769 bushels of flaxseed at \$4 a bushel, and received in pay 300 barrels of flour at \$8 a barrel, and the balance in cash; how much cash did I receive?
101. What cost 350 barrels of herrings at \$5 a barrel?
102. A man bought 150 acres of land at \$5 an acre and sold it again at \$8 an acre; how much did he gain by his bargain?
103. $17638 + 8$ times itself = how many?
104. 20, 8, and 7, are the factors of what number?
105. A farmer sold 5 cows at \$24 a head, 7 young cattle at \$16 each, 45 sheep at \$3 a head, and 10 pigs at \$2 each; what did the whole amount to?

TABLE.

| | | |
|---------------|----------------|---------------------|
| 9 times 1 = 9 | 9 times 5 = 45 | $9 \times 9 = 81$ |
| 9 " 2 = 18 | 9 " 6 = 54 | $9 \times 10 = 90$ |
| 9 " 3 = 27 | 9 " 7 = 63 | $9 \times 11 = 99$ |
| 9 " 4 = 36 | 9 " 8 = 72 | $9 \times 12 = 108$ |

1. How long will 1 man take to do a piece of work that 3 men can perform in 9 days?

SOLUTION.—If 3 men take 9 days to do the work, 1 man will take 3 times 9 days = 27 days. Therefore, if 3 men take 9 days, 1 man will take 27 days to do the work.

2. Add 9's to 100;—commencing with 2,—5, —7,—4.

Find the value of,

- | | |
|--------------------|--|
| 106. 6897684 × 9. | 111. $76 \times 9 \times 7 \times 8$. |
| 107. 38726347 × 9. | 112. $80 \times 8 + 178 \times 9$. |
| 108. 38769984 × 9. | 113. $7876 \times 9 - 768$. |
| 109. 71689768 × 9. | 114. $91768 - 9 \times 87$. |
| 110. 76987684 × 9. | 115. $1716 \times 7 \times 8 \times 9$. |

116. How long will a quantity of hay suffice 1 horse, that 9 horses would eat in 29 days?

117. If a man earn \$3 a day, how much will he earn in a year?

118. If a man drink 3 glasses of spirits a day, how much will he drink in a year; how many cents would it cost at 5 cents a glass?

TABLE.

| | | |
|-----------------|-----------------|---------------|
| 10 times 1 = 10 | 10 times 9 = 90 | 11 × 5 = 55 |
| 10 " 2 = 20 | 10 " 10 = 100 | 11 × 6 = 66 |
| 10 " 3 = 30 | 10 " 11 = 110 | 11 × 7 = 77 |
| 10 " 4 = 40 | 10 " 12 = 120 | 11 × 8 = 88 |
| 10 " 5 = 50 | 11 " 1 = 11 | 11 × 9 = 99 |
| 10 " 6 = 60 | 11 " 2 = 22 | 11 × 10 = 110 |
| 10 " 7 = 70 | 11 " 3 = 33 | 11 × 11 = 121 |
| 10 " 8 = 80 | 11 " 4 = 44 | 11 × 12 = 132 |

31. To multiply by 10, 100, 1000, &c., annex as many ciphers to the multiplicand as the multiplier contains ciphers. Thus, $3 \times 100 = 300$.

1. What cost 100 yards of cloth at \$3 a yard?
2. At \$5 a barrel, what cost 1000 barrels of flour?
3. $1000 \times 10 =$ how many? $10 \times 1000?$ $100 \times 100?$
4. Count 10's and 11's to 100 and backwards;—commencing with 5.

119. 9, 10, 19, and 100, are the factors of what number?

120. If 68 men can do a piece of work in 11 days, how long will it take 1 man to do the same?

121. What sum must be distributed among 100 men, to give each one \$590?

122. How many pins will a boy point in 9 weeks, if he work 8 hours a day, and point 10,000 pins in an hour?

123. In 1 year are 365 days; how many days in 10 years?

124. $716937 \times 11 + 8763809 \times 11 - 39864 \times 11 =$ how many?

125. In 1 pound are 20 shillings, and in 1 dollar, 5 shillings; how many shillings are there in 746 pounds, and 600 dollars?

126. A gentleman's yearly income is \$1000, and his expenses \$3 a day; how does he stand at the end of the year?

TABLE.

| | | |
|-----------------|-----------------|----------------------|
| 12 times 1 = 12 | 12 times 5 = 60 | $12 \times 9 = 108$ |
| 12 " 2 = 24 | 12 " 6 = 72 | $12 \times 10 = 120$ |
| 12 " 3 = 36 | 12 " 7 = 84 | $12 \times 11 = 132$ |
| 12 " 4 = 48 | 12 " 8 = 96 | $12 \times 12 = 144$ |

32. A *composite* number is one that is the product of two or more factors. Thus, 21 is a composite number, being the product of 3 and 7.

33. A *prime* number is one that is not the product of two factors; as 3, 5.

34. To multiply by a composite number,

RULE.—Multiply successively by the factors. The last product is the answer. Ciphers at the right hand of the multiplier or multiplicand may be omitted and annexed to the product.

1. What are the factors of 8, 20, 24, 36, and 200?
2. Add 12's to 144;—commencing at 6.
3. What is the value of 45 ac. of land at \$128 per acre?

OPERATION.

\$128 price of 1 acre.

5

Product

$$\begin{array}{r} 0 \\ 2 \times 0 \\ 0 \end{array}$$

\$5760

40 " 5 acres.

9 " 45 acres.

The pupil should name only the figures of the product in multiplying. Thus, "in the example, multiplying by 5 we say, 40—14—6 at the same time setting down the

units and carrying the tens.

Find the value of,

- | | |
|--|------------------------------|
| 1. $720 \times 11 \times 10 \times 100.$ | 7. $580726 \times 44.$ |
| 2. $678 \times 12 \times 11 \times 12.$ | 8. $428571 \times 540.$ |
| 3. $768 \times 24 \times 33.$ | 9. $405719 \times 960.$ |
| 4. $378549 \times 27.$ | 10. $64839 \times 1200.$ |
| 5. $357928 \times 35.$ | 11. $6974 \times 144 + 28.$ |
| 6. $707584 \times 22.$ | 12. $4567 \times 132 + 129.$ |

13. 6, 11, 18, and 24 are the factors of what number?

14. If 250 acres of land worth \$25 per acre be exchanged for 300 acres valued at \$24 per acre, what is gained by the transaction?

1. What is a composite number?
2. What is a prime number?
3. What are all the composite numbers below 100?—
the prime numbers?
4. How do you multiply by a composite number?
5. What cost 4 dozen chairs at \$3 a piece?

35. To multiply by a number exceeding 12 that is not a composite number,

RULE.—Write the multiplier under the multiplicand and multiply the multiplicand by each figure of the multiplier separately, taking care to place the first figure of each partial product directly beneath the figure multiplied by; then add the products.

EXAMPLE.—Multiply 371 by 47.

$$\begin{array}{r}
 371 \\
 47 \\
 \hline
 2597 \\
 1484 \\
 \hline
 17437
 \end{array}$$

17437 Product.

thousands, &c. Hence, we set down the first figure of each partial product directly beneath the figure we multiply by.

Here $4 = 4$ tens; 1 unit $\times 4$ tens = 4 tens; hence we set the 4 in the tens' place. In the same way units multiplied by hundreds would give hundreds, units by thousands would give

Find the value of,

- | | |
|-----------------------------|----------------------------------|
| 1. 47963852×23 . | 7. 498857×4967 . |
| 2. 25836974×45 . | 8. 390867×50989 . |
| 3. 59826473×67 . | 9. 862479×537089 . |
| 4. 52007498×405 . | 10. 378600×75000 . |
| 5. 7964280×387 . | 11. $687900 \times 87400 + 90$. |
| 6. $607 \times 356 + 349$. | 12. $92000 \times 97000 + 79$. |

1. What is the weight of 25 bushels of wheat, 60 pounds being allowed to a bushel ?

2. What is the cost of 45 barrels of pork, at \$18 a brl. ?

3. What cost 1000 barrels of flour at \$7 a barrel ?

4. 40, 20, and 100, are the factors of what number ?

5. How many are $7 \times 5 + 7 \times 6 + 7 \times 8$? —
 $9 \times 4 + 9 \times 5 + 9 \times 6$? — $7 \times 8 + 6 \times 8 + 6 \times 9$?
 — $112 \times 11 - 11 \times 112$?

13. How many are six hundred and forty one thousand four hundred and forty times four hundred and ninety seven thousand three hundred and sixteen ?

14. Two trains leave Toronto at the same time, going in opposite directions, one at the rate of 25 miles an hour, and the other at 37 miles an hour ; how far apart will they be at the end of 2 hours ?

15. What time will one man require to dig a trench, that 37 men can dig in 9 days ?

16. 36, 78, 99, and 1000, are the factors of what number ?

17. What sum must be distributed among 25 men and 19 boys, to give each man twice a boy's share, and each boy \$15 ?

18. What is the number of the strokes of the hammer of a clock in a day ? — year ?

19. How many seeds were produced by a bean which had 14 stems, each stem, 19 pods, and each pod, 6 beans ?

20. How much does one thousand thousand exceed fifty times twenty thousand ?

21. A man left to his son \$19536, and to each of his six daughters \$9768 ; how much did he leave them ?

22. How many bushels of oats will fill 500 of each of three kinds of bags, which contain respectively 2 bushels, 3 bushels, and 4 bushels ?

58 MULTIPLICATION OF THE DECIMAL CURRENCY.

36. To multiply dollars and cents.

RULE.—Multiply as in simple numbers, and point off the two right hand figures for cents.

EXAMPLE.—What cost 5 yards of cloth at \$1.75 a yard?

| | | |
|------------|--------|--------------------------|
| OPERATION. | \$1.75 | If 1 yard cost \$1.75 |
| | 5 | 5 yards would cost |
| | <hr/> | 5 times \$1.75 = \$8.75. |
| | \$8.75 | |

1. A lady purchased 6 yards of satin at \$2.50 a yard, 4 yards of muslin at 75 cents a yard, and a pair of gloves at \$1.10; what is the amount of her purchase?

2. A man bought 4 rakes at 25 cents a piece, 3 pitchforks at \$1.50 each, 5 hoes at 70 cents each, and a grindstone at \$2.50; what did he pay for the whole?

3. What cost 2 dozen brooms at 20 cents each?

Find the value of,

- | | |
|---------------------------|------------------------------|
| 1. \$9609.30 × 72. | 5. \$0.06 × 15950. |
| 2. \$874.03 × 611. | 6. \$1.89 × 279 + \$1.44. |
| 3. \$172.01 × 1000. | 7. \$9.46 × 103260 + \$2.40. |
| 4. \$497 × 2600 + \$0.01. | 8. \$15.07 + \$41.07 × 700. |

9. What is the cost of 95 ploughs at \$15.25 each, and 78 harrows at \$9 each?

10. At 12 cents a pound, what must be paid for three boxes of sugar each containing 125 pounds?

11. Bought 11 yards of French merino at \$1.05 a yard, 14 yards of cambric at 12 cts. a yard, 25 yards of cotton at 15 cts., 1 dozen sets of cuffs and collars at 15 cts. per set, a hat at \$2.30, and gaiters for \$3.25; What did the whole cost?

MULTIPLICATION OF THE DECIMAL CURRENCY. 59

1. How do you multiply dollars and cents?
2. What cost 100 nails at 1 cent each? — at 3 cents?
3. What cost 300 oranges at 7 cents a piece?

SOLUTION.—100 oranges at 1 ct. = 100 ct. = \$1. $\frac{1}{10}$

100 " " 7 cts. = 700 cts. = \$7.

300 " " 7 cts. = 3 times \$7 = \$21.

37. To multiply by 10, 100, 1000, &c., remove the decimal point as many places to the right as the multiplier contains ciphers, annexing ciphers if necessary. The decimal point is understood when not expressed at the right of dollars.

4. What cost 400 shad at 5 cents a piece?
5. What cost a barrel of pork (200 lbs.), at 8 cts. a pound?
12. What is the difference in the value of two pieces of cloth, the first containing 57 yards at \$3.85 a yard, the second, 47 yards at \$4.75 per yard?
13. What cost 1000 barrels of apples at \$2.35 a barrel?
14. What cost 1000 bricks at 2 cents each?
15. At 5 cents a pound, what would 15 barrels of beef amount to?
16. A man bought a horse at \$97.50, and to pay for him gave 6 tons of hay at \$9.25 per ton, and the balance in wheat at \$1 a bushel; how many bushels of wheat must he give?
17. A lumber merchant bought 95 thousand feet of white pine at 10 cts. a foot, 115 thousand feet of red pine at 22 cts., 16897 feet of oak at 32 cts., and 69768 feet of elm for \$1567; if he sell the whole on an average of 25 cents per foot, what will be his net gain?

60 MULTIPLICATION OF THE DECIMAL CURRENCY.

1. How do you multiply by 10, 100, &c. ?
2. What will 8 barrels of beef amount to at 9 cents per pound ?
3. What cost 20 barrels of pork at 2 cents a pound, and 15 hundredweight of cheese at 11 cents a pound ?
18. What will the wages of 16 men amount to in a year, at \$1.25 a day to each men ?
19. A man killed an ox which he sold as follows ; the hind quarters weighing 129 pounds each at 6 cents a pounds ; the fore quarters 125 pounds each at 5 cents a pound, and the hide and tallow weighing 163 pounds at 7 cents per pound ; what did the whole amount to ?

REVIEW OF MULTIPLICATION.

1. What is multiplication ? 24.
2. What are the multiplicand, multiplier, and product ?
3. How many times do you repeat a number by multiplying it ? 25.
4. How is multiplication proved ? 28.
5. What is a composite number ? 32.
6. What are the factors of a number ? 30.
7. What are all the composite numbers below 100 ? — the prime numbers ?
8. How do you multiply by a composite number ? 34.
9. How do you multiply by 10, 100, &c. ? 31. 37.
10. How do you multiply by a number exceeding 12, that is not a composite number ? 35.
11. Why do you place the first figure of each partial product directly beneath the figure multiplied by ?
12. How do you multiply dollars and cents ? 36.

D I V I S I O N .

38. Division teaches us to find how often one number is contained in another.

The number to be divided is called the *dividend*, the number we divide by is called the *divisor*, and the number that shows how often the divisor is contained in the dividend is called the *quotient*. If anything remains after dividing it is called the *remainder*.

EXAMPLE 1. How many pens at 1 cent, can you buy for 2 cents ?

2. How many pencils at 2 cts. can you buy for 6 cts. ?

SOLUTION.—For 6 cents, I shall have as many pencils at 2 cents, as the number of times I can take 2 cents from 6 cents, which is 3 times. Therefore for 6 cents I shall have 3 pencils.

3. If a man can earn \$2 a day, how long will it take him to earn \$8 ?

SOLUTION.—At \$2 a day, it will take him as many days to earn \$8, as the number of times \$2 is contained in \$8 ; \$2 in \$8, 4 times. Therefore at \$2 a day, he must work 4 days to earn \$8.

The following tables should be learnt thoroughly, and the relation they sustain to the others clearly explained.

TABLE.

| | | |
|------------|-------------|-------------|
| 2 in 2 = 1 | 2 in 10 = 5 | 2 in 18 = 9 |
| 2 " 4 = 2 | 2 " 12 = 6 | 2 " 20 = 10 |
| 2 " 6 = 3 | 2 " 14 = 7 | 2 " 22 = 11 |
| 2 " 8 = 4 | 2 " 16 = 8 | 2 " 24 = 12 |

39. EXAMPLE 1. Divide 86754 by 2.

2)86754 Having written the divisor on the left of
 43378 the dividend we commence at the highest
 order to divide. 2 is contained 4 times in 8;
 set down the 4 under 8; 2 in 6, 3 times; 2 in 7, 3
 times and 1 over; 1 = 10 of next lower order, added to
 5 make 15; 2 in 15, 7 times and 1 over; 1 = 10, + 6
 = 16; 2 in 16, 8 times.

RULE.—Begin at the left hand and divide each figure
 of the dividend by the divisor, setting down the quotient
 figure directly beneath the figure divided. If there be
 a remainder join it as so many tens to the next figure
 of the dividend, and divide as before.

40. PROOF.—Multiply the quotient by the divisor
 adding in the remainder if any; the product should be
 the same as the dividend.

41. The sign \div denotes division. $8 \div 2 = 4$ is read
 8 divided by 2 equal 4.

Division is also denoted by a horizontal line separat-
 ing the terms; as $\frac{8}{2} = 4$.

2. Divide 736827 by 2.

1. 2)86021848

Divisor 2)736027 Dividend.

Quotient 368013 — 1 rem.
 2

2. 2)40267342

736027 Proof.

3. 2)94620246

TABLE.

| | | |
|------------|-------------|-------------|
| 3 in 3 = 1 | 3 in 15 = 5 | 3 in 27 = 9 |
| 3 " 6 = 2 | 3 " 18 = 6 | 3 " 30 = 10 |
| 3 " 9 = 3 | 3 " 21 = 7 | 3 " 33 = 11 |
| 3 " 12 = 4 | 3 " 24 = 8 | 3 " 36 = 12 |

1. At \$2 a bushel, how many bushels of wheat can we buy for \$10?

2. Charles distributed 21 apples among a number of his companions, giving each one 3 apples; how many boys were there?

3. How many threes in 16? 36? 24? 9? 27? 21? 18?

4. Count threes to 100 and backwards;—commencing with 8,—4:

$$\begin{array}{r} (4) \\ 2 \overline{) 699318621} \end{array}$$

$$\begin{array}{r} (5) \\ 2 \overline{) 687073638} \end{array}$$

$$\begin{array}{r} (6) \\ 2 \overline{) 187368768} \end{array}$$

$$\begin{array}{r} (7) \\ 2 \overline{) 132675672} \end{array}$$

$$\begin{array}{r} (8) \\ 2 \overline{) 710703360} \end{array}$$

$$\begin{array}{r} (9) \\ 2 \overline{) 876836822} \end{array}$$

$$\begin{array}{r} (10) \\ 3 \overline{) 821607362} \end{array}$$

$$\begin{array}{r} (11) \\ 3 \overline{) 814674368} \end{array}$$

$$\begin{array}{r} (12) \\ 3 \overline{) 973687368} \end{array}$$

$$\begin{array}{r} (13) \\ 3 \overline{) 876873684} \end{array}$$

$$\begin{array}{r} (14) \\ 3 \overline{) 171073687} \end{array}$$

$$\begin{array}{r} (15) \\ 3 \overline{) 871025546} \end{array}$$

$$\begin{array}{r} (16) \\ 3 \overline{) 189074687} \end{array}$$

$$\begin{array}{r} (17) \\ 3 \overline{) 187209671} \end{array}$$

$$\begin{array}{r} (18) \\ 3 \overline{) 72099878} \end{array}$$

TABLE.

$$\begin{array}{l} 4 \text{ in } 4 = 1 \\ 4 \text{ " } 8 = 2 \\ 4 \text{ " } 12 = 3 \\ 4 \text{ " } 16 = 4 \end{array}$$

$$\begin{array}{l} 4 \text{ in } 20 = 5 \\ 4 \text{ " } 24 = 6 \\ 4 \text{ " } 28 = 7 \\ 4 \text{ " } 32 = 8 \end{array}$$

$$\begin{array}{l} 4 \text{ in } 36 = 9 \\ 4 \text{ " } 40 = 10 \\ 4 \text{ " } 44 = 11 \\ 4 \text{ " } 48 = 12 \end{array}$$

1. What does division teach?
2. Which are the dividend, divisor, and quotient, in the 19th exercise?
3. Seven times 4 = how many?—how many 4's?—7's?
4. 40 = how many 4's?—10's?
5. Count 4's to 100 and backwards;—commencing with 3,—1,—2.
6. How many coats each containing 4 yards, can be made from 18 yards of cloth? What remnant is left?

$$\begin{array}{r} (19) \\ 4 \overline{)897689124} \end{array}$$

$$\begin{array}{r} (20) \\ 4 \overline{)8710768734} \end{array}$$

$$\begin{array}{r} (21) \\ 4 \overline{)6710216325} \end{array}$$

$$\begin{array}{r} (22) \\ 4 \overline{)8321096725} \end{array}$$

$$\begin{array}{r} (23) \\ 4 \overline{)932768737} \end{array}$$

$$\begin{array}{r} (24) \\ 4 \overline{)832710237} \end{array}$$

$$\begin{array}{r} (25) \\ 3 \overline{)7137689142} \end{array}$$

$$\begin{array}{r} (26) \\ 4 \overline{)127143685} \end{array}$$

$$\begin{array}{r} (27) \\ 4 \overline{)83210973} \end{array}$$

$$\begin{array}{r} (28) \\ 4 \overline{)68732854} \end{array}$$

$$\begin{array}{r} (29) \\ 3 \overline{)671321099} \end{array}$$

$$\begin{array}{r} (30) \\ 4 \overline{)3871073211} \end{array}$$

$$\begin{array}{r} (31) \\ 4 \overline{)9175387690} \end{array}$$

$$\begin{array}{r} (32) \\ 4 \overline{)7435491073} \end{array}$$

$$\begin{array}{r} (33) \\ 4 \overline{)6531269057} \end{array}$$

TABLE.

| | | |
|------------------|------------------|------------------|
| 5 in 5, 1 (once) | 5 in 25, 5 times | 5 in 45, 9 times |
| 5 " 10, 2 times | 5 " 30, 6 " | 5 " 50, 10 " |
| 5 " 15, 3 " | 5 " 35, 7 " | 5 " 55, 11 " |
| 5 " 20, 4 " | 5 " 40, 8 " | 5 " 60, 12 " |

quotient, in
many 4's?

commencing

yards, can be
ant is left?

$$\begin{array}{r} (21) \\ 5 \overline{) 6710216325} \end{array}$$

$$\begin{array}{r} (24) \\ 4 \overline{) 832710237} \end{array}$$

$$\begin{array}{r} (27) \\ 4 \overline{) 83210973} \end{array}$$

$$\begin{array}{r} (30) \\ 4 \overline{) 3871073211} \end{array}$$

$$\begin{array}{r} (33) \\ 4 \overline{) 6531269057} \end{array}$$

1. If 5 barrels of fish cost \$20, what is that per barrel?
SOLUTION.—If 5 barrels cost \$20, 1 barrel will cost 5 times less or 1 fifth of \$20; 1 fifth of \$20 = \$4; much therefore 1 barrel would cost \$4.

2. Emma paid 45 cents for 5 Second readers; how is that for each book?

3. 12 times 5 = how many?—how many 12's? —5's?

4. Count 5's to 100 and backwards;—commencing with 3,—1,—4.

$$\begin{array}{r} (34) \\ 5 \overline{) 876930024} \end{array}$$

$$\begin{array}{r} (35) \\ 5 \overline{) 312072691} \end{array}$$

$$\begin{array}{r} (36) \\ 5 \overline{) 871687068} \end{array}$$

$$\begin{array}{r} (37) \\ 5 \overline{) 710736809} \end{array}$$

$$\begin{array}{r} (38) \\ 5 \overline{) 483607268} \end{array}$$

$$\begin{array}{r} (39) \\ 4 \overline{) 312007303} \end{array}$$

$$\begin{array}{r} (40) \\ 5 \overline{) 187102632} \end{array}$$

$$\begin{array}{r} (41) \\ 5 \overline{) 710736891} \end{array}$$

$$\begin{array}{r} (42) \\ 4 \overline{) 402073689} \end{array}$$

$$\begin{array}{r} (43) \\ 5 \overline{) 912691438} \end{array}$$

$$\begin{array}{r} (44) \\ 3 \overline{) 144671832} \end{array}$$

$$\begin{array}{r} (45) \\ 5 \overline{) 371689073} \end{array}$$

$$\begin{array}{r} (46) \\ 5 \overline{) 567100263} \end{array}$$

$$\begin{array}{r} (47) \\ 3 \overline{) 417168973} \end{array}$$

$$\begin{array}{r} (48) \\ 5 \overline{) 891683732} \end{array}$$

TABLE.

in 45, 9 times
" 50, 10 "
" 55, 11 "
" 60, 12 "

$$\begin{array}{l} 6 \text{ in } 6 = 1 \\ 6 \text{ " } 12 = 2 \\ 6 \text{ " } 18 = 3 \\ 6 \text{ " } 24 = 4 \end{array}$$

$$\begin{array}{l} 6 \text{ in } 30 = 5 \\ 6 \text{ " } 36 = 6 \\ 6 \text{ " } 42 = 7 \\ 6 \text{ " } 48 = 8 \end{array}$$

$$\begin{array}{l} 54 \div 6 = 9 \\ 60 \div 6 = 10 \\ 66 \div 6 = 11 \\ 72 \div 6 = 12 \end{array}$$

E

1. What does division teach ?
2. What are the given terms of division ?
3. What is the required term ?
4. Count 6's to 100 and backwards ;—commencing with 4,—2,—11,—9.

| | | |
|--------------------|---------------------|--------------------|
| (49) | (54) | (59) |
| $721073689 \div 6$ | $1673268740 \div 6$ | $107326889 \div 4$ |

| | | |
|--------------------|---------------------|--------------------|
| (50) | (55) | (60) |
| $610726478 \div 6$ | $1710932674 \div 5$ | $109768769 \div 6$ |

| | | |
|--------------------|---------------------|--------------------|
| (51) | (56) | (61) |
| $847687367 \div 6$ | $4007326871 \div 5$ | $147368766 \div 6$ |

| | | |
|---------------------|---------------------|--------------------|
| (52) | (57) | (62) |
| $8109265543 \div 6$ | $8107268718 \div 5$ | $447891870 \div 6$ |

| | | |
|--------------------|--------------------|--------------------|
| (53) | (58) | (63) |
| $732609368 \div 6$ | $710736879 \div 6$ | $876807681 \div 3$ |

64. A man paid \$1974 for 6 village lots; what is the cost of each lot ?
65. If 1000 acres of land be divided equally among six persons; what is each share ?

TABLE.

| | | |
|------------|-------------|------------------|
| 6 in 6 = 1 | 6 in 30 = 5 | $54 \div 6 = 9$ |
| 6 " 12 = 2 | 6 " 36 = 6 | $60 \div 6 = 10$ |
| 6 " 18 = 3 | 6 " 42 = 7 | $66 \div 6 = 11$ |
| 6 " 24 = 4 | 6 " 48 = 8 | $72 \div 6 = 12$ |

1. If 3 books cost \$13 what cost 1 book ?

SOLUTION.—If 3 books cost \$13, 1 book will cost 3 times less or 1 third of \$13; 1 third of \$13 = \$4, and \$1 over which must be divided into 3 equal parts; $\$1 \div 3 = \$\frac{1}{3}$ (39). 1 book will cost $\$4 + \frac{1}{3}$ of a dollar = $\$4\frac{1}{3}$.

NOTE.— $\frac{1}{3}$ is read 1 third; $\frac{2}{3}$, two thirds; $\frac{3}{5}$, three fifths, &c. These numbers being parts of a unit are called fractions.

2. How much is $\frac{1}{4}$ of 20 ?—of 75 ?

3. 7×12 = how many times 7 ?—12 ?—6 ?

4. Count 7's to 100 and backwards;—commencing with 3,—5,—9,—4.

66. $9107368732 \div 7$.

68. $\$9870073847 \div 7$.

67. $10721036871 \div 7$.

69. $\$8167367284 \div 7$.

70. Harry King divided 108 marbles equally among 4 of his companions; how many did each receive?

71. A man paid \$127 for 7 cows; what is the price of 1 cow at that rate?

72. How many 5 bushel bags can be filled from a bin containing 3870 bushels of oats?

73. $\frac{1}{4}$ of 6789768 dollars = how much?

74. $\frac{27941}{7}$ = how many?

75. A man had 81 sheep, and sold 1 third of them; how many had he left?

76. How many coats each containing 4 yards, can be made from 2 pieces of cloth, each containing 47 yards?

TABLE.

| | | |
|------------|-------------|------------------|
| 8 in 8 = 1 | 8 in 40 = 5 | $72 \div 8 = 9$ |
| 8 " 16 = 2 | 8 " 48 = 6 | $80 \div 8 = 10$ |
| 8 " 24 = 3 | 8 " 56 = 7 | $88 \div 8 = 11$ |
| 8 " 32 = 4 | 8 " 64 = 8 | $96 \div 8 = 12$ |

Division is the reverse of multiplication. Division diminishes a number as many times as multiplication increases it; hence,

42. Multiplying and dividing any quantity by the same number does not change it.

1. How much is $8 \times 10 \div 10$? $\frac{12 \times 8}{8}$?
2. $687 \times 8 =$ how many times 8?
3. How do you prove division?—Why? 41.
4. Reckon 8's to 100 and backwards;—commencing with 5,—2,—6,—4.

$$\begin{array}{r} (77) \\ 8 \overline{) 872637240} \end{array}$$

$$\begin{array}{r} (81) \\ 8 \overline{) 137168732} \end{array}$$

$$\begin{array}{r} (85) \\ 8 \overline{) 68976878} \end{array}$$

$$\begin{array}{r} (78) \\ 8 \overline{) 387632645} \end{array}$$

$$\begin{array}{r} (82) \\ 7 \overline{) 193729687} \end{array}$$

$$\begin{array}{r} (86) \\ 6 \overline{) 176873678} \end{array}$$

$$\begin{array}{r} (79) \\ 8 \overline{) 871647687} \end{array}$$

$$\begin{array}{r} (83) \\ 8 \overline{) 839837988} \end{array}$$

$$\begin{array}{r} (87) \\ 8 \overline{) 47694369} \end{array}$$

$$\begin{array}{r} (80) \\ 8 \overline{) 683268716} \end{array}$$

$$\begin{array}{r} (84) \\ 8 \overline{) 507302938} \end{array}$$

$$\begin{array}{r} (88) \\ 8 \overline{) 987387689} \end{array}$$

$$89. \frac{8768}{8} \times 8 + \frac{67325}{7} \times 7 = \text{how much?}$$

90. If 1958 trees be planted in 8 rows, how many trees will there be in each row?

TABLE.

| | | |
|-------------------|-------------------|-------------------|
| 9 in 9 = 1 (once) | 9 in 45 = 5 times | $81 \div 9 = 9$ |
| 9 " 18 = 2 times | 9 " 54 = 6 " | $90 \div 9 = 10$ |
| 9 " 27 = 3 " | 9 " 63 = 7 " | $99 \div 9 = 11$ |
| 9 " 36 = 4 " | 9 " 72 = 8 " | $108 \div 9 = 12$ |

1. If 6 cows sell for \$126, and 3 pigs for \$21; how many pigs are equal in value to one cow?

2. A man invested \$360 in flour, paying \$9 a barrel; if he sell at \$11, how much will he gain on the transaction?

3. If 63 be the dividend, and 9 the divisor; what is the quotient?

4. Reckon 9's to 100 and backwards;—commencing with 3,—6,—1,—7,—5,—8.

Find the value of,

91. $7207389 \div 9$.

92. $8173610354 \div 9$.

93. $71548954736 \div 9$.

94. $38907687314 \div 9$.

2107689768987

95. $\frac{\quad}{9}$.

96. $3876847 \div 7 \div 9$.

97. $8716878 \div 9 \div 8$.

98. $8716876 \div 6 \div 8$.

99. $71096789799 \div 9$.

1476871819

100. $\frac{\quad}{9} = 7689$.

101. It is required to put 216 hats into 8 boxes; how many hats will there be in each box?

102. \$28970, is the dividend, and 8 the divisor; what is the quotient?

103. How many sheep at \$5 a head, can be bought with the avails of 25 cords of wood, sold at the rate of \$3 a cord?

TABLE.

$11 \div 11 = 1$

$11 \div 22 = 2$

$11 \div 33 = 3$

$11 \div 44 = 4$

$11 \div 55 = 5$

$11 \div 66 = 6$

$11 \div 77 = 7$

$11 \div 88 = 8$

$11 \div 99 = 9$

$11 \div 110 = 10$

$11 \div 121 = 11$

$11 \div 132 = 12$

$12 \div 12 = 1$

$12 \div 24 = 2$

$12 \div 36 = 3$

$12 \div 48 = 4$

$12 \div 60 = 5$

$12 \div 72 = 6$

$12 \div 84 = 7$

$12 \div 96 = 8$

$12 \div 108 = 9$

$12 \div 120 = 10$

$12 \div 132 = 11$

$12 \div 144 = 12$

1. How many oranges at 5 cents, and lemons at 6 cents; and of each an equal number, can be bought for 33 cents?

2. How many cows at \$12, must be exchanged for 120 sheep at \$5 each?

3. Reckon 11's and 12's to 100 and backwards; —commencing with 6, —9, —8, —7, —2, —5, —10.

Find the value of,

104. $1170736872 \div 11.$

105. $4710736891 \div 11.$

106. $7109736891 \div 11.$

107. $8107356432 \div 11.$

108. $8710736878 \div 11.$

109. $9107687681 \div 12.$

110. $71321076871 \div 12.$

111. $81473687368 \div 12.$

112. $91210736871 \div 12.$

113. $1072163872 \div 12.$

114. A teacher's salary is \$300 per annum; how much may he spend monthly, and save \$100 in one year?

115. Divide 100 cents among Emma, Kate, and Colin, so that Colin may have twice as much as his sisters?

116. How many canisters each holding 12 pounds, can be filled from 1584 pounds of tea?

$$7689 \times 12 \quad 7689$$

117. Find the amount of $\frac{\quad}{12} - \frac{\quad}{11} \times 11.$

118. How many bags holding respectively 2 bushels, and 3 bushels, and of each kind an equal number, can be filled from a bin containing 5876 bushels?

119. 12 times one thousand is how many times 12?

$$6710976897896$$

120. $\frac{\quad}{12} =$ how many?

12

121. A gentleman possessing an estate of \$68000, bequeathed $\frac{1}{4}$ to his wife and the remainder to his four children; what was the share of each?

43. To divide by a composite number exceeding 12.

RULE.—Divide successively by the factors. To obtain the true remainder, multiply the last remainder by the first divisor, adding in the first remainder if any.

To divide by 10, 100, &c., cut off as many figures from the right of the dividend as the divisor contains ciphers. Thus, $198 \div 10 = 19.8$, (19 times and 8 over).

1. If 2 dozen chairs cost \$72, what is the price of 1 chair?

SOLUTION.—1 chair = $\$72 \div 12 \div 2 = \3 .

2. Divide 5771 by 45.

OPERATION.—5771

$$\begin{array}{r} 9 \overline{) 1154} - 1 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Quotient. } 128 - 2 \\ \hline 9 \end{array}$$

$$\begin{array}{r} 1154 \times 5 \\ \hline \end{array}$$

Proof. 5771

$$45 = 5 \times 9.$$

$$2 \times 5 + 1 = \text{true rem.}$$

$$128 \frac{1}{45} \text{ Ans.}$$

Find the value of,

1. $\frac{7920000}{11 \times 10 \times 100}$

$$1073952 \div 12$$

2. $\frac{1073952}{11 \times 12}$

3. $608256 \div 24 \div 33$.

4. $10220823 \div 27$.

13. $28512 = \text{how many times } 66 \times 18?$

14. Bought 250 acres of land for \$6250, and exchanged it for 300 acres valued at \$7200; what is the difference in the cost of 1 acre of each kind?

5. $12527480 \div 35$.

6. $19966848 \div 22$.

7. $25551944 \div 44$.

8. $231428340 \div 540$.

9. $389490240 \div 960$.

10. $77806800 \div 1200$.

11. $1004284 \div 144$.

12. $602973 \div 132$.

1. How do you divide by a composite number?
2. How much is $720 \div 10$?—100?

44. To divide by a number exceeding 12, that is not a composite number.

RULE.—Find how often the divisor is contained in the least number of figures at the left of the dividend that will contain it, and place the number in the quotient, at the right of the dividend. Multiply the divisor by quotient figure, subtract the product from the figures divided, and to the remainder annex the next figure of the dividend; divide this number as before, and continue the operation till the whole of the dividend is divided.

When there are ciphers at the right of the divisor cut them off, also as many figures at the right of the dividend, which must be annexed to the remainder. 43. 49.

EXAMPLE.—Divide 66049 by 31.

31) 66049 (2130 $\frac{1}{2}$ quot.

62 31

— —

40 2130

31 6390

— 19

94 —

93 66049 Proof.

—

19

Here 66 is the least number of figures that will contain the divisor; 31 is contained in 66, 2 times; 2 times 31 = 62; 62 from 66, leave 4. Annexing 0 to 4 we leave 40 the next number to be divided; 31 in 40 goes 1 time, once 31 subtracted from 40 leaves 9; to this we bring down the next

figure of the dividend, and divide as before.—31 is contained in 66049, 2130 $\frac{1}{2}$ times.

Find the value of,

1. $1103168596 \div 23$.
2. $1162663830 \div 45$.
3. $4008373691 \div 67$.
4. $21063036690 \div 405$.
5. $3082176360 \div 387$.
6. $216441 \div 607$.

7. $2467902719 \div 4967$.
8. $19929917463 \div 50989$.
9. $463227983631 \div 537089$.
10. $28395000000 \div 75000$.
11. $60122460900 \div 87400$.
12. $8924000079 \div 97000$.

1. What three factors will produce 240?
2. The product of two or more factors divided by one factor gives what?
3. What number multiplied by 50 will give 1000?
4. What number divided by 20 will give 50?
5. If 864 be dividend, and 72 quotient; what is the divisor?
13. What number multiplied by 497316 will give 318998375040?
14. Two trains leave Toronto at the same time, going in opposite directions, one at the rate of 25 miles an hour, and the other at 37 miles an hour; in what time will they be 1426 miles apart?
15. In what time should 37 men dig a trench that one man can dig in 333 days?
16. What factor together with these three, viz. 36, 78, and 1000, will produce 277992000?
17. Divide \$1035 among 25 men and 19 boys, and give each man twice a boy's share.
18. The strokes of the hammer of a clock are 56340 in a year; how many is that per day?
19. 1596 beans were produced by a bean which had 4 stems, and each stem 19 pods; how many beans each pod?
20. One million is how many times one thousand?
21. A man's effects amounted to \$78144; of this, his son was to have $\frac{1}{4}$, and the remainder was to be divided equally among his six daughters; what was each one's share?
22. How many bags containing respectively 2, 3, and 4 bushels, and an equal number of each, can be filled from a bin containing 4500 bushels of oats?

74 GENERAL PRINCIPLES AND APPLICATIONS.

45. The product of two factors, divided by one factor, gives the other; $108(9 \times 12) \div 12 = 9$; and $108 \div 9 = 12$.

NOTE.—The dividend corresponds to the product, the divisor and quotient are its factors.

46. The product of any number of factors, divided by one or more of the factors, gives the product of the remaining factors. Thus, $3 \times 4 \times 5 \div 3 \div 5 = 4$.

47. Multiplying the dividend, or dividing the divisor, multiplies the quotient.

Thus, $\frac{40}{4} = 10$, while $\frac{40 \times 2}{4}$ or $\frac{40}{4 \div 2} = 20$ (or twice 10).

48. Dividing the dividend, or multiplying the divisor, divides the quotient.

Thus, $\frac{28}{7} = 4$, and $\frac{28 \div 2}{7}$ or $\frac{28}{7 \times 2} = 2$.

49. Multiplying or dividing both dividend and divisor by the same number, does not affect the value of the

quotient. Thus, $\frac{12 \times 2}{4 \times 2} = \frac{12 \div 4}{4 \div 4} = 3$.

1. $3 \times 4 \times 5 \div 3 \div 4 =$ how many? 45.

2. 900 is the product of three factors, two of which are 4, and 25; what is the third factor?

3. 270 is the product, and 90 the multiplicand; what is the multiplier?

4. What is $2\frac{3}{4}$ multiplied by 6?

5. How much is $8\frac{0}{6} \times 3$?— $7\frac{2}{3} \times 6$? 46.

6. How much is $1\frac{8}{6} \div 3$?— $2\frac{4}{4} \div 4$? 47.

GENERAL PRINCIPLES AND APPLICATIONS. 75

1. Give examples of Art. 44 and 45.
2. Give examples of Art. 46, 47, and 48.

1. Find the value of $4 \times 6 \times 20$ divided by $10 \times 5 \times 4$.

OPERATION.—Here the operation may be shortened by cancelling any factor common to the dividend and divisor; for this only divides both dividend and divisor by the same number, which does not change the value of the quotient (48.) 4 cancels 4 and 4, and 10 cancels 10, and

$$\begin{array}{r} 4 \times 6 \times 20 \\ \hline 10 \times 5 \times 4 \\ \hline 4 \times 6 \times 20 \\ \hline 10 \times 5 \times 4 \\ \hline 6 \times 2 \end{array} = \begin{array}{r} 12 \\ \hline 10 \\ \hline 12 \\ \hline 10 \\ \hline 6 \times 2 \end{array}$$

$\frac{6 \times 2}{5} = \frac{12}{5} = 2\frac{2}{5}$ Ans. reduces 20 to 2, leaving $\frac{12}{5} = 2\frac{2}{5}$.

50. When multiplication and division occur in the same question, the terms should be first connected by signs and cancelled; to facilitate which the following should be borne in mind :

Any even number is divisible by 2. If the two last figures divide by 4, the whole will divide by 4. If the three last figures divide by 8, the whole will divide by 8. A number ending in 0, is divisible by 10 and 2.

Find the value of,

$$\begin{array}{l} 2. 40 \times 12 \times 8 \div (5 \times 8). \\ 3. 87 \times 9 \times 8 \div 8 \div 7. \\ 4. \frac{70 \times 6 \times 4 \times 18}{9 \times 3 \times 4} \end{array} \quad \left| \quad \begin{array}{l} 5. \frac{12 \times 50 \times 72}{9 \times 24 \times 25}. \\ 6. \frac{88 \times 20 + 36 \times 100}{4000}. \end{array} \right.$$

7. If 15 be multiplied by 7, 27, and 40, and the product divided by 54 multiplied by 40, 10, and 2; what will be the result?
8. How many pounds of butter at 15 cents, will be required to pay for 60 pounds of sugar, at 9 cents per pound?
9. A man exchanged 28 boxes of soap, each containing 24 pounds, at 9 cents a pound, for 126 barrels of ashes each containing 3 bushels; what was allowed a bushel for the ashes?

76 GENERAL PRINCIPLES AND APPLICATIONS.

51. When the multiplicand or multiplier contains a fraction :

EXAMPLE 1. What cost $4\frac{2}{3}$ yards of cloth at 25 cents a yard ?

OPERATION.—4 yards at 25 cents will cost 4 times 25 cents = 100 cents = \$1. $\frac{2}{3}$ of a yard will cost $\frac{2}{3}$ of 25 cents. But $\frac{2}{3}$ denotes $2 \div 3$, hence, to multiply by $\frac{2}{3}$, we must multiply by 2, and divide the product by 3 ;

| | | |
|---------|---------|--|
| 25 cts. | 25 cts. | |
| 4 | 2 | |
| 100 | — | |
| 163 | 3 50 | |
| — | — | |
| \$1.163 | 163 | |

25 cts. $\times 2$

3

added to 100 cents = 1163 cents = \$1.163. Ans.

NOTE.—The figure below the line, which corresponds to the divisor, is called the denominator; and the figure above the line, which corresponds to the dividend, is called the numerator.

RULE.—To multiply the fraction, multiply the numerator, and divide the product by the denominator; multiply the whole number separately, and add the products.

52. PROOF.—The best method of proving multiplication is by division.

2. What cost $2\frac{1}{4}$ yards of cloth at 20 cents a yard ?
3. Multiply 6 by $4\frac{1}{2}$, $\frac{2}{3}$, $6\frac{1}{2}$.
4. What cost 8 sheep at \$5 $\frac{1}{2}$ a head ?
1. What cost 35 books at \$2 $\frac{3}{4}$ each ?
2. What will 1224 $\frac{1}{2}$ bushels of oats weigh at 34 pounds to the bushel ?
3. How much is $\frac{2}{3}$ of 143 bushels of corn ?
4. In 254 dress patterns, each containing 10 $\frac{1}{2}$ yards; how many yards ?
5. What cost 15 $\frac{3}{4}$ yards at \$2.50 a yard ?
6. If a man travel $24\frac{6}{10}$ miles in an hour, how far will he travel in 3 days at 12 hours a day ?

GENERAL PRINCIPLES AND APPLICATIONS. 77

53. When the divisor or dividend contains a fraction :

EXAMPLE 1. Divide 72 by $4\frac{1}{3}$.

OPERATION.—We first multiply both divisor and dividend by the denominator of the fraction, which does not change the quotient (48), in order to get rid of the fraction, and then divide as in whole numbers. 3 times $\frac{1}{3} = \frac{3}{3} = 1$ (48 and 50); 3 times 4 are 12, and 1 carried are 13; 3 times 72 are 216; then $216 \div 13 = 16\frac{8}{13}$. Ans.

| | | |
|------------------|----------|----------------------|
| $4\frac{1}{3}$ | 72 | |
| 3 | 3 | |
| $\overline{)13}$ | 216 | ($16\frac{8}{13}$) |
| | 13 | |
| | <hr/> 86 | |
| | 78 | |
| | <hr/> 8 | |

RULE.—Multiply both divisor and dividend by the denominator of the fraction, and divide as in whole numbers.

2. If $2\frac{1}{2}$ yards cost 45 cents, what is that per yard?
3. Divide 3 by $1\frac{1}{2}$; — by $2\frac{1}{2}$.
4. $4\frac{1}{2}$ bushels of buckwheat weigh 180 pounds; what is the weight of 1 bushel?
5. If the ploughing of 3 acres of land cost $\$7\frac{1}{2}$; how is that per acre?
1. If 35 books cost $\$93\frac{1}{2}$, what is the price of 1 book?
2. 1224 $\frac{1}{2}$ bushels of oats weigh 41620 $\frac{1}{2}$ pounds; what is the weight of 1 bushel?
3. How much is $61\frac{2}{3} \div \frac{2}{3}$?
4. In 2667 yards of silk how many dress patterns of $10\frac{1}{2}$ yards each?
5. $15\frac{3}{4}$ yards of cloth cost $\$39$; what is it per yard?
6. At $\$17$ a ton how many tons of hay can be bought for $\$164\frac{1}{10}$?
7. If a man travel $77\frac{1}{2}$ miles in 3 days, travelling 12 hours a day, how much is that per hour?

78 DIVISION OF THE DECIMAL CURRENCY.

54. To divide dollars and cents by a simple number :

RULE.—Divide as in simple numbers, and point off the two right hand figures for cents. The quotient is of the same denomination as the dividend.

55. To divide by dollars and cents :

RULE.—Reduce both terms to cents by taking away the decimal points, and divide as in simple numbers. The quotient will be a simple number.

Taking away the decimal point multiplies by 100, the number of cents in 1 dollar; and since both terms are multiplied by the same number the quotient is not changed. 48.

EXAMPLE 1. Divide \$3 into 4 equal parts.

$$\begin{array}{r} 4 \overline{) \$3.00} \\ \$0.75 \end{array} \quad \$3 = 3 \times 100 \text{ c.} = 300 \text{ c.}; 300 \text{ c.} \div 4 = 75 \text{ c.}$$

2. How many cents in \$5?—\$2?—\$10?—\$9?

3. How many pence at 3 cents, can you buy for \$1?

Find the value of,

- | | |
|----------------------------|--------------------------------------|
| 1. $\$691869.60 \div 72.$ | 5. $\$957 \div \$0.06; \div \$0.15.$ |
| 2. $\$534032.33 \div 611.$ | 6. $\$528.75 \div \$1.89.$ |
| 3. $\$172610 \div 1000.$ | 7. $\$976842 \div \$9.46.$ |
| 4. $1292200.01 \div 2600.$ | 8. $\$28764.07 \div \$41.07.$ |

9. A man paid \$1448.75 for 95 ploughs, and \$702 for 78 harrows; what is the price of 1 plough, and 1 harrow?

10. Paid \$45 for three boxes of sugar, each containing 125 pounds; what is the price per pound?

11. A lady purchased 11 yards of French merino for \$11.55, 14 yards of cambric for \$1.48, 25 yards of cotton at 15 cents a yard, a hat at \$2.30, a pair of gaiters at \$3.25, and a number of sets of cuffs and collars at 15 cents per set, which amounted in all to \$25.53; I demand the number of sets of cuffs and collars?

DIVISION OF THE DECIMAL CURRENCY. 79

56. To divide by 10, 100, &c., remove the decimal points 1, 2, &c. places to the left.

1. How do you divide dollars and cents by a simple number? Of what name is the quotient?

2. How do you divide by dollars and cents?

3. What is the price of 1 pencil, at \$1 per hundred?

4. At \$11 per hundred weight, what is the price of 1 pound of cheese?

SOLUTION.—

1 lb. at \$1 per cwt., would cost $\frac{1}{100}$ of \$1 = 1 cent.

1 lb. at \$11 per cwt., " " 11 times 1 ct. = 11 cts.

5. At \$2 per hundred, what would 15 herrings cost?

12. Bought 57 yards of cloth for \$213.45, and 47 yards for \$223.25; what is the difference in the price of 1 yard of each?

13. Paid \$2350 for 1000 barrels of apples; what is the price per barrel?

14. How many bricks at 2 cents, will amount to \$20?

15. 15 barrels of beef cost \$150; what is the price per pound?

16. A man sold a horse at \$97.50, and took in pay 42 bushels of wheat at \$1 a bushel, and 6 tons of hay; what was the hay valued at per ton?

17. A lumber merchant purchased 95 thousand feet of white pine, which amounted to \$9500; 113 thousand feet of red pine for \$24860; 16897 feet of oak for \$5407.04; 69768 feet of elm for \$1567; what is the cost of each kind per foot, and at what average price should it be sold, to gain \$32332.21 on the whole?

18. The wages of 16 men amounted to \$6260 in 1 year; what is the price of 1 day's work?

80 DIVISION OF THE DECIMAL CURRENCY.

1. \$7 per hundred is how much per unit?
2. What is the price of 1 pound of pork, at \$9 a barrel?
19. A man sold an ox as follows: the hind quarter at 6 cents a pound, which amounted to \$15.48; the fore quarters at 5 cents, which amounted to \$12.50; the hide and tallow at 7 cents, amounted to \$11.41; what was the weight of the ox?

REVIEW OF DIVISION.

1. What does division teach? 38.
2. What are the given terms of division?—the required term?
3. What is the dividend?—divisor?—quotient?
4. How do you divide by a number not exceeding 12? 38.
5. How do you prove division?—Why? 40. 42. 52.
6. How do you divide by a composite number? 43.
7. How do you divide by 10, 100, &c.? 43. 56.
8. How is long division performed? 44.
9. Describe the relation division bears to multiplication. 42.
10. What is the effect of multiplying and dividing a quantity by the same number? 42.
11. The product of two or more factors divided by one factor gives what? 45. 46.
12. What is the effect of multiplying the dividend, or dividing the divisor? 47.
13. What is the effect of dividing the dividend, or multiplying the divisor? 48.
14. What is the effect of multiplying or dividing both dividend and divisor by the same number? 49.
15. How do you multiply by a fraction? 51.
16. How do you divide by a fraction? 53.
17. How do you divide dollars and cents, by a simple number? Of what name is the quotient? 54.
18. How do you proceed when both divisor and dividend consist of dollars and cents? Of what name is the quotient? 55.

MISCELLANEOUS EX. IN PRECEDING RULES. 81

1. What will the wages of 7 men amount to in 3 weeks, at \$2 a day ?

2. What number is that from which if 250 be taken, the remainder will be 500 ?

3. Upper and Lower Canada were united in 1841 ; how long is it since ?

1. How many pounds of pork at 6 cents, can be bought for \$375 ?

2. What number added to 9994, will make 100900 ?

3. If a man spend \$1.17 a day, how much will he spend in a year ?

4. How many times can 1000 be taken from one million ?

5. The United States contains 2,936,116 square miles ; the British North American Provinces, 2,878,361 square miles ; what is the difference in the areas of these two countries ?

6. A gentleman's estate came to £25000, and he left £2000 to each of his three daughters, £4000 to each of his two younger sons, and the rest to his eldest son ; what was his portion ?

7. From 27 yards of cloth were cut 8 coats, each containing $2\frac{1}{4}$ yards ; how much cloth remained ?

8. Find the value of $\frac{762 \times 380}{190} + \frac{68 \times 30 \times 8}{15 \times 16 \times 4}$

9. 17 times 3400 is how many times 68 ?

10. There are 32 quarts in one bushel ; how many quarts must I dip from a bin of grain to make $1\frac{1}{4}$ bushels ?

11. A man spends \$310.25 in a year, and saves \$180 ; what is his daily expense ?

12. How many tons of coal at \$6, will be required to pay for 70 barrels of flour at \$5.35 a barrel ?

82 MISCELLANEOUS EX. IN PRECEDING RULES.

1. A's age multiplied by 2, or B's divided by 2, equals 30 years; what are their ages?

2. 60 is divisor, 7 the remainder, and 40 the quotient; what is the dividend?

3. What number divided by 1500, and multiplied by 1000, will make 1000?

13. How much is $(200 + 300 - 100) \times 400 \div 100 + 500 - 50 \times 15$?

14. Find the value of

$$1600 \times 796 + \frac{3760}{80} + \frac{730 \times 4}{8} - 280 \div 720 - \frac{700}{35}$$

15. Nicholas Copernicus was born at Thorn, Prussia, in 1473, and died in 1543; how old was he at his death?

16. 978 is the sum of two numbers; 897 is one number, what is the other?

17. If 90007 be minuend, and 908 the difference, what will be the subtrahend?

18. The product of two factors is 4891095, and 369 is one factor; what is the other factor?

19. If the divisor be 69874, and the quotient 896385; what is the dividend?

20. 28395000000 is the dividend, and 75000 the divisor; what is the quotient?

21. Bought 35 barrels of pork at \$10.75 a barrel: if the whole is retailed at 9 cents per pound, what is gained by the transaction?

22. Bought 12 dozen pairs of scissors for \$36; if I sell them out at 37 cents per pair, what do I gain per pair and on the whole?

Mr. J.

7 yds
10 "
12 "
25 "
20 "
Threa
Butto

Miss

12 yds
13½ "
25½ "
51 "
25 "
6 pai

92 lb
85
80
450
125½
119½

BILLS OF PARCELS.

83

TORONTO, April 13th, 1866.

MR. JOHN McDONALD,

BOUGHT OF MURRAY & CO.,

| | |
|--------------------------|----------|
| 7 yds. Broad Cloth,..... | @ \$4.50 |
| 10 " Shalloon,..... | @ \$0.90 |
| 12 " Serge, | @ \$0.75 |
| 25 " Cassimere,..... | @ \$1.09 |
| 20 " Cotton,..... | @ \$0.20 |
| Thread,..... | @ \$0.25 |
| Buttons,..... | @ \$0.25 |
| | <hr/> \$ |

CLINTON, January 3rd, 1866.

MISS KATE DANVERS,

BOUGHT OF B. O'REILLY,

| | |
|--------------------------|----------|
| 12 yds. Fine lace,..... | @ \$3.50 |
| 13½ " Satin, | @ \$2.75 |
| 25½ " Damask,..... | @ \$1.90 |
| 51 " Cambric,..... | @ \$0.19 |
| 25 " Cotton, | @ \$0.20 |
| 6 pairs Kid Gloves,..... | @ \$1.35 |
| | <hr/> \$ |

MONTREAL, August 1st, 1865.

MR. H. GRANT,

BOUGHT OF J. LABELLE,

| | |
|-----------------------|-----------|
| 92 lbs. of Tea,..... | @ \$0.90 |
| 85 " Coffee, | @ \$0.30 |
| 80 " Soap, | @ \$0.05 |
| 450 " Sugar,..... | @ \$0.12½ |
| 125½ " Currants,..... | @ \$0.10 |
| 119½ " Raisins,..... | @ \$0.20 |
| | <hr/> \$ |

Received payment,

J. LABELLE.

57. Analysis is the solution of problems on general principles, unaided by specific rules.

By analysis a question is resolved into its parts, and each part considered separately; thus rendering each step of the solution plain and intelligible.

The following general principles should be observed:

58. When the price of 1 unit of any quantity is given, to find the price of that quantity; multiply the price of 1 unit by the quantity.

59. When a quantity and its price are given, to find the price of 1 unit of that quantity; divide the price by the quantity.

60. The price of a quantity and the price of a unit of that quantity being given, to find the quantity; divide the price of the quantity by the price of unity.

1. If 1 barrel of flour cost \$6, what will 25 barrels cost?

SOLUTION.—If 1 barrel cost \$6, 25 barrels will cost 25 times \$6 = \$150. **58.**

2. If 25 barrels of flour cost \$150, what will 1 barrel cost?

SOLUTION.—If 25 barrels cost \$150, 1 barrel will cost $\frac{1}{25}$ of \$150 = \$6. **59.**

3. At \$6 a barrel, how many barrels of flour can be purchased for \$150?

SOLUTION.—Since 1 barrel cost \$6, for \$150 we can get as many barrels as \$6 is contained times in \$150; $\$150 \div \$6 = 25$; therefore for \$150 we can purchase 25 barrels. **60.**

4. If 50 sheep cost \$125 what is the price of 1 sheep?

5. At 15 cents each, what will 1000 cedar rails cost?

6. How many rails at 15 cents, will amount to \$150?

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3. 5
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4. I
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SOL

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1. W

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4. W

5. If

6. If

7. W

8. If

1. If 3 pounds of coffee cost 24 cents, what will 5 pounds cost?

SOLUTION.—First find the price of 1 pound; if 3 pounds cost 24 cents, 1 pound will cost one third of 24 cents = 8 cents.

If 1 pound cost 8 cents, 5 pounds will cost 5 times 8 cents = 40 cents.

2. A merchant sold 5 yards of cloth for \$15; what will 7 yards of cloth cost at the same rate?

3. 5 oranges cost 25 cents; how much is that per dozen?

4. If 8 barrels of flour cost \$76, what will be the cost of 326 barrels?

SOLUTION.—If 8 barrels cost \$76,

1 barrel will cost $\frac{1}{8}$ of \$76 = \$9.50
326 barrels will cost 326 times \$9.50 =

$$\begin{array}{r} 19 \\ \$76 \times 326 \\ \hline \end{array} \quad \begin{array}{l} \text{(cancelled by 4)} \\ \hline \end{array} = \$3087.50$$

61. Write down first the term that is of the same name as the answer, and compare the other terms with it to make the statement. Connect the terms by signs and cancel, before multiplying, &c. 49.

1. What cost 5 oranges at 60 cents a dozen?
2. If 4 yds. of cloth cost \$25.50, what will 24 yds. cost?
3. If 24 yds. of cloth cost \$153, what will 4 yds. cost?
4. What will 51 cords of wood amount to, at \$10 for 3 cords?
5. If 8 sheep cost \$32, what will 5 sheep cost?
6. If 7 pounds of wool cost \$2.10, how much will 29 pounds cost?
7. What cost 8 chairs, at \$25.60 a dozen?
8. If 42 acres of land cost \$252, what will 182 ac. cost?

1. If \$3 pay for 6 yards of linen, how many yards will \$7 pay for ?

SOLUTION.—If \$3 pay for 6 yards, \$1 will pay for $\frac{1}{2}$ of 6 yards = 2 yards. If \$1 pay for 2 yards \$7 will pay for 7 times 2 yards. = 14 yards.

2. If \$7 pay for 14 yards how many yds. will \$3 pay for ?

3. If 3 yards cost \$2 how much can be bought for \$8 ?

9. If \$4 pay for 5 days' works how many days' works will \$20 pay for ?

10. If 40 bushels of oats cost \$8, how many bushels can be obtained for \$125 ?

11. If \$125 pay for 625 bushels of oats, how many bushels will \$8 pay for ?

12. What cost 625 bushels of oats at \$8 for 40 bushels ?

13. What cost 40 bushels, at \$125 for 625 bushels ?

14. If 5 hogs cost \$32.50, how many will \$201.50 buy ?

15. If 15 pounds of wool make 13 yards of cloth, how many yards will 240 pounds make ?

16. If 18 bags of salt cost \$17.20, what will 171 bags cost ?

17. Paid \$45 for 18 pairs of boots; how many pairs can be obtained for \$187.50 ?

18. If 4 cows make $26\frac{1}{2}$ pounds of butter a week, how much should be expected from 25 cows in the same time ?

19. If 385 yards of linen cost \$252, how much will 110 yards cost ?

20. How many pounds of wool will make 208 yards of cloth, at 15 pounds to 13 yards ?

21. If three yards of broad cloth cost \$13.20, what will $24\frac{1}{2}$ yards cost ?

22. If 90 yards of shalloon cost \$72, how many yards can be bought for \$396 ?

1. What cost a barrel of beef at 7 cents a pound?

SOLUTION.—100 lbs. at 1 cent = 100 cents = \$1.

100 lbs. at 7 cents = 7 times \$1 = \$7.

200 lbs. at 7 cents = 2 times \$7 = \$14.

2. What cost 5 cwt. of cheese at 10 cents a pound?

3. At 5 cents a pound, what cost 3 barrels of beef?

4. What cost 4 pounds of beef at \$7 per cwt.?

SOLUTION.—1 lb. at \$1 per cwt. = $\frac{1}{100}$ of \$1 = 1 cent.

1 lb. at \$7 per cwt. = 7 times 1 cent = 7 cents.

4 lbs. at \$7 " " = 4 times 7 cents = 28 cents.

5. What cost 1 pound at \$4 per cwt.?

6. At \$6 per cwt., what cost 2 pounds?—5 pounds?

23. What would 15 brls. of beef amount to at 6 cts. per lb?

24. What cost 65 cwt. of cheese at $10\frac{1}{2}$ cts. per pound?

25. At \$15 a barrel, what will 32 lbs. of pork cost?

26. What cost 375 bricks at \$8 per thousand?

SOLUTION.—If 1000 cost \$8, 1 brick will cost $\frac{1}{1000}$ of

\$8

\$8 = $\frac{\quad}{1000}$, and 375 bricks will cost 375 times $\frac{\$8}{1000}$

\$8 \times .375

= $\frac{\quad}{1.000}$ = \$3.

27. At \$252 a thousand, what cost 7896 cedar rails?

28. What cost 89769 feet of boards at \$25 a thousand?

29. What will 125 barrels of fish cost at $2\frac{1}{2}$ cts. per lb.?

30. $24\frac{1}{2}$ yards of cloth cost \$107.80; what is the price of 3 yards?

31. What cost 15 brooms at \$20 per hundred?

32. How many hoes will amount to \$45.50, at \$8.40 per dozen?

33. What cost 17 thousand bricks at 10 bricks for 3 cts?

34. Paid \$262.20 for 276 gallons of molasses; what quantity can I purchase for \$452.50?

1. How long would 3 men be employed at a piece of work that 4 men can accomplish in 10 days?

SOLUTION.—If 4 men take 10 days, 1 man would require 4 times 10 days = 40 days to do the work.

If 1 man take 40 days, 3 men would do the work in $\frac{1}{3}$ of 40 days = $13\frac{1}{3}$ = 13 $\frac{1}{3}$ days.

2. If 2 men can do a piece of work in 7 days ; in what time would 5 men do the same ?

3. If 5 men can mow a piece of land in 8 days, in how many days should 10 men mow it?

35. How long should 18 horses feed on a quantity of oats, that would last 6 horses 21 days.

36. If 7 men build a house in 24 days, in what time should 18 men build it?

37. If Ann can spin 20 skeins of yarn in 4 days, in what time can she spin 35 skeins?

38. If 1 $\frac{1}{4}$ cwt. of sugar cost \$9.90, what will 25 pounds cost?

39. How many yards of cloth, 3 quarters wide, will line 27 yards that is 5 quarters wide?

40. If 5 coats be equal in value to 9 cloaks, how many coats will be equal in value to 25 cloaks?

41. If 2000 men have provisions for 6 months, how many men would the same quantity serve 8 months?

42. If 275 reams of paper cost \$330, how much can be bought for \$1188?

43. If 56 pounds of tea cost \$34, what will 7 boxes each 2 $\frac{1}{4}$ cwt. cost?

44. What cost 8973 shingles, at \$8 per thousand?

45. If 7 men can build a wall in 20 days, how many men should build it in 7 days?

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47. H

48. P

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51. I

52. V

53. I

54. I

55. V

56.

1. Bought 100 sheep at \$2.15 each ; how many pounds of wool at 30 cents will pay for them ?

SOLUTION.—100 sheep at \$2.15, will cost 100 times \$2.15 = \$215 ; it will take as many pounds to pay for them as 30 cents, the price of 1 pound, is contained times

$$\frac{\$215}{\$0.30} = 716\frac{2}{3} \text{ pounds.}$$

2. How many pounds of tea at 40 cents, must be given for 20 pounds of butter at 12 cents per pound ?

3. How many pounds of butter at 15 cents will be required to pay for 3 cows at \$25 a head ?

46. How many acres of land at \$6.60 should be given in exchange for 630 acres at \$3 ?

47. How many barrels of flour at \$4.90, are equivalent in value to 1000 bushels of wheat at \$1.09 per bushel ?

48. Paid \$49.60 for 32 yards of silk ; what quantity can be purchased for \$223.20 ?

49. What is a man's wages for 146 days, at the rate of \$148.80 per annum ?

50. If 2 horses be equal in value to 5 cows, how many cows must be given for 20 horses ?

51. If 2 springs of a dog be equal to 3 springs of a hare, how many of the dog's springs equal 150 springs of the hare ?

52. What is the assessment on \$767.25, at 2 cts. in the \$?

53. If 4 casks of raisins each $1\frac{1}{4}$ cwt. cost \$92, what quantity can be obtained for \$2.30 ?

54. If 75 cwt. be carried 20 miles for \$2.50, how far should 325 cwt. be carried for the same money ?

55. What will 46 pieces of cloth, each containing 57 yards, cost at \$4 for 3 yards ?

56. 14 packs of wool each 420 pounds cost \$896, what is that per hundred weight ?

1. Kitty's age multiplied by 12, or Colin's by 9, will make 144; what is the difference in their ages?
2. What number added to 5 times itself will make 24?
3. A woman sold 3 dozen eggs at 15 cents a dozen, and 10 pounds of butter at 15 cents a pound. She took in pay 6 yards of print at 20 cents a yard, and the balance in sugar at 12 cents a pound; how many pounds of sugar did she receive?
57. If 7 men consume 12 pounds of bread a day, how much bread will serve a garrison of 350 men a year?
58. How many feet of sawed lumber, at \$15 a hundred, would be equivalent to 62368 feet of timber, at \$70 a thousand?
50. If 28 reapers finish a harvest in 36 days, how many reapers will do it in 9 days?
60. If \$100 gain \$6 in 1 year, how much should \$630 gain in 2 years?
61. How many books at 85 cents, can I buy with the avails of 7 cords of wood, sold at the rate of \$11 for 3 cords?
62. A man sold 15 hundred weight of cheese at 11 cents a pound. He received in pay \$60 in cash, 17 yards of cloth at \$3.27 a yard, 52 yards of cotton at 18 cents, a hat at \$2.10, and the balance in tea at 75 cents a pound; how much tea did he receive?
63. If a man earn \$2.50 a day, and spend \$4 a week, how many acres of land at \$1.75 can he purchase with the earnings of a year, (313 days)?
64. A grocer bought 7 hundred weight of beef at 7 cents a pound, and paid for it in tea at 95 cents, sugar at 13 cents, coffee at 32 cents, giving of each an equal quantity; how many pounds did he dispose of in all?

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62. Simple Numbers are those that express things of but one kind or denomination, as 2 shillings, also 4, 6, 8.

63. Compound Numbers express more than one denomination, as 1 pound 5 shillings.

Tables of Money, Weights, and Measures.

NOTE.—The tables and mental exercises should be taught in connection with reduction; the first series of mental exercises * with Reduction Descending, (67.) and the second series † with Reduction Ascending. (68.)

CANADIAN DECIMAL MONEY.

100 cents (ct.) make 1 dollar,

The coins are a 5 cent piece, a 10 cent piece, and a 20 cent piece of silver, and a one cent piece of bronze.

The cent piece is one inch in diameter, and 100 cents weigh one pound Avoirdupois.

UNITED STATES OR FEDERAL MONEY.

10 mills (m) make 1 cent marked ct.

10 cents " 1 dime " d.

10 dimes " 1 dollar " \$

10 dollars " 1 eagle " E.

- *1. Give an example of a simple number.
2. Give an example of a compound number.
3. Repeat the table of Canadian decimal money.
4. Repeat the table of Federal money.
5. In 3 dollars and 25 cents, how many cents?

SOLUTION.—1 \$ = 100 c. ; 3 \$ = 3 times 100 c. = 300 c.
 $300 \text{ c.} + 25 \text{ c.} = 325 \text{ c.}$

6 How do you multiply by 100? — 1000?

7. How many cents in \$7? — \$7.90? — \$19.50?

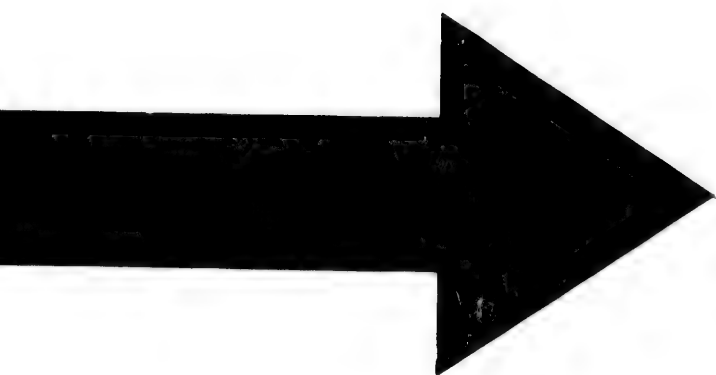
8. In \$8 and 2 dimes, how many dimes, cents, and mills?

†1. In 325 cents, how many dollars?

2. Reduce 600 cts., 725 cts., and 1508 cts., to dollars.

3. In 8000 mills, how many dollars?





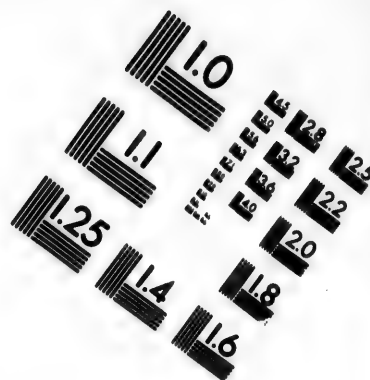
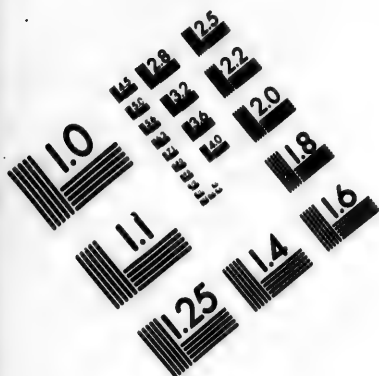
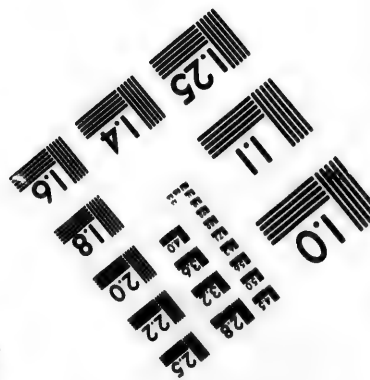
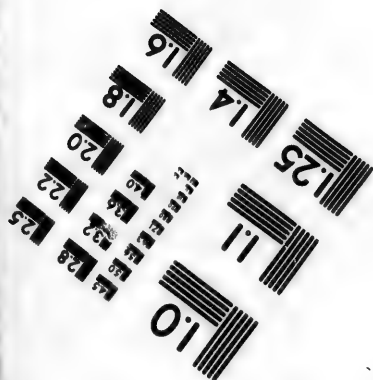
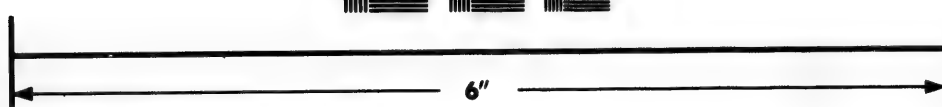
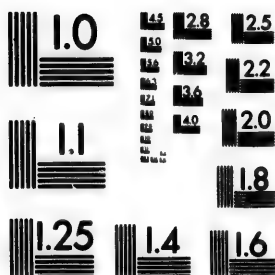


IMAGE EVALUATION TEST TARGET (MT-3)



Photographic
Sciences
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23 WEST MAIN STREET
WEBSTER, N.Y. 14580
(716) 872-4503

2.8
2.5
2.2
2.0
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10
01

OLD CANADIAN CURRENCY.

| | |
|-------------------------------------|------------------------|
| 4 farthings | make 1 penny marked d. |
| 12 pence | " 1 shilling " s. |
| 5 shillings | " 1 dollar " \$ |
| 20 shillings or \$4 | " 1 pound " £ |
| 1 farthing is written $\frac{1}{4}$ | of a penny. |
| 2 " " | $\frac{1}{2}$ " |
| 3 " " | $\frac{3}{4}$ " |

1. Repeat the table.
2. Repeat the table backwards, thus :

1 pound = 20 shillings.
 1 shilling = 12 pence.
 1 penny = 4 farthings.

3. In 3 shillings, how many pence ?

SOLUTION.—1 shilling = 12 pence ;
 3 shillings = 3 times 12 pence = 36 pence.

4. How many pence in 5s., 9s., 4s. 6d., 7s. 9d., 15s. ?
5. In 1 shilling how many farthings ? In 2 shillings ?
6. How many shillings in £2, £4, £6, 2s. ?

1. How many shillings in 36 pence ?

SOLUTION.—It takes 12 pence to make 1 shilling ; in 36 pence there will be as many shillings as 12d. is contained times in 36d. ; $36d \div 12d = 3$. Therefore, 36 pence = 3 shillings.

2. How many shillings in 24d., 36d., 70d., 40d., 44d., 72d., 80d., 96d. ?
3. How many pounds in 40s., 70s., 60s., 45s., 90s., 48s., 70s., 240d., 960 farthings.

ENGLISH OR STERLING MONEY.

| | |
|--------------|-------------------------|
| 4 farthings | make 1 penny, marked d. |
| 12 pence | " 1 shilling " s. |
| 20 shillings | " 1 pound " £ |

The sovereign represents the pound sterling ; 1 guinea is 21 shillings ; and 1 crown, 5 shillings.

1. Repeat the table.
2. In 5 crowns, how many pence ?

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AVOIRDUPOIS WEIGHT.

This weight is used for all ordinary purposes of weighing.

| | | |
|----------------------|---------------------|------------|
| 16 drams (dr.) | make 1 ounce | marked oz. |
| 16 ounces | " 1 pound | " lb. |
| 25 pounds | " 1 quarter | " qr. |
| 100 pounds or 4 qr. | " 1 hundred weight, | cwt. |
| 20 cwt. or 2000 lbs. | " 1 ton | " T. |

28 lbs. to the quarter, or 112 lbs. to the hundred weight, was formerly allowed.

1. In 4 pounds, how many ounces?
2. How many ounces in 3 lbs.?—6 lbs. 2 oz.?
3. In 7 cwt., how many pounds?
4. In 4 tons, 16 cwt., how many pounds?

1. In 48 ounces, how many pounds?
2. In 310 lbs., how many hundred weights?
3. In 4800 lbs., how many tons?

TROY WEIGHT.

| | | |
|------------------|---------------------|-------------|
| 24 grains (gr.) | make 1 penny weight | marked dwt. |
| 20 penny weights | " 1 ounce | " oz. |
| 12 ounces | " 1 pound | " lb. |

Troy weight is used in weighing the precious metals, also in scientific investigations.

1. In 3 lbs. 2 oz., how many ounces?
2. In 1 ounce, how many grains?
3. How many pounds in 50 ounces?
4. How many ounces in 65 penny weights?

APOTHECARIES WEIGHT.

Apothecaries mix their medicines by this weight, but they buy and sell by Avoirdupois weight?

| | | |
|-----------------|----------------|-------------|
| 20 grains (gr.) | make 1 scruple | marked scr. |
| 3 scruples | " 1 dram | " dr. |
| 8 drams | " 1 ounce | " oz. |
| 12 ounces | " 1 pound | " lb. |

DRY MEASURE.

| | | | | |
|------------|------|------------|--------|------|
| 2 pints | make | 1 quart | marked | qt. |
| 4 quarts | " | 1 gallon | " | gal. |
| 2 gallons | " | 1 peck | " | pk. |
| 4 pecks | " | 1 bushel | " | bu. |
| 36 bushels | " | 1 chaldron | " | ch. |

Grain is often sold by weight, allowing for a bushel, 60 lbs. of wheat, peas, Timothy or red clover seed, 56 lbs. of rye or Indian corn, 50 lbs. of beans, 48 lbs. of barley, 40 lbs. of buckwheat and 34 lbs. of oats.

1. In 1 peck, how many quarts?—pints?
2. In 1 bushel, how many quarts?
3. Reduce 8 bus. 2 pks. to gallons.

1. How many gallons in 40 pints?
2. In 40 quarts, how many pecks?
3. In 32 quarts, how many bushels?

LIQUID MEASURE.

| | | | | |
|-------------------|------|---------------------|--------|------|
| 4 gills (gi.) | make | 1 pint | marked | pt. |
| 2 pints | " | 1 quart | " | qt. |
| 4 quarts | " | 1 gallon | " | gal. |
| 31½ gallons | " | 1 barrel | " | bar. |
| 2 bar. or 63 gal. | " | 1 hogshead | " | hhd. |
| 2 hogshead | " | 1 pipe | " | pi. |
| 2 pipes | " | 1 ton | " | tn. |
| 36 gallons | " | 1 barrel of beer. | | |
| 54 gallons | " | 1 hogshead of beer. | | |

1. In 4 gallons, how many pints?
 2. In 1 barrel, how many quarts?
 3. In 1 pipe and 1 barrel, how many barrels?
1. In 48 pints, how many gallons?
 2. How many hogsheads in 189 gallons?
 3. In 9 barrels. how many pipes?

CLOTH MEASURE.

| | | |
|-----------------|------------------|-----------|
| 2½ inches (in.) | make 1 nail | marked n. |
| 4 nails | " 1 quarter | " qr. |
| 4 quarters | " 1 yard | " yd. |
| 3 quarters | " 1 Flemish ell. | " Fl. e. |
| 5 quarters | " 1 English ell. | " E. e. |
| 6 quarters | " 1 French ell. | " Fr. e. |

1. In 3 yards, how many quarters?
2. In 1 yard, how many nails and inches?
3. In 4 E. e., how many quarters?

1. In 20 quarters, how many yards?
2. In 36 inches, how many yards?
3. In 2 yards, how many Fl. ells.?

LINEAR MEASURE.

Linear or Long measure is used in measuring lines.

| | | |
|------------------------|--------------------------|--------------|
| 12 lines (l.) | make 1 inch, | marked in. |
| 12 inches | " 1 foot, | " ft. |
| 3 feet | " 1 yard, | " yd. |
| 5½ yards | " 1 rod, pole, or perch, | " rd. p. |
| 40 rods | " 1 furlong, | " fur. |
| 8 furlongs or 320 rds. | " 1 mile, | " m. |
| 3 miles | " 1 league, | " lea. |
| 69½ miles (nearly) | " 1 degree, | " deg. or °. |

4 inches make 1 hand, (used in measuring horses).

| | |
|-------------|-------------------|
| 18 inches | " 1 cubit. |
| 3 feet | " 1 pace. |
| 6 feet | " 1 fathom. |
| 120 fathoms | " 1 cable length. |

1. For what is Linear measure used?
2. How many inches in 2 ft.?—7 ft. 3 in.?
3. In 4 yards, how many inches?
4. In 1 mile, how many yards and feet?
1. 180 inches = how many yards?

SQUARE OR LAND MEASURE.

1 yd.=3 ft.



In square measure both length and breadth are considered. A square yard is a yard long and a yard wide, or 3 feet long and 3 feet wide, equal to 3 rows of 3 square feet each. A square foot consists of 12 rows of 12 square inches each, i.e. 12 times 12 = 144 square inches. Hence :

Length multiplied by the breadth gives the square contents, or area of any surface.

| | |
|-------------------------------|------------------------------------|
| 144 square inches | make 1 square foot, marked sq. ft. |
| 9 square feet | " 1 square yard, " sq. yd. |
| 30 $\frac{1}{4}$ square yards | " 1 square perch " sq. pr. |
| 40 square perches | " 1 rood, " r. |
| 4 roods or 160 sq. per. | " 1 acre, " a. |
| 640 acres | " 1 square mile, " sq. m. |

In measuring land Gunter's chain is used. It is divided into 100 links :

| | |
|---------------------------|----------------|
| 7 $\frac{92}{100}$ inches | make 1 link. |
| 100 links or 4 rds. | " 1 chain. |
| 80 chains | " 1 mile. |
| 10000 square links | " 1 sq. chain. |
| 10 square chains | " 1 acre. |

1. What dimensions are considered in square measure ?
2. What is a square foot ?
3. How are the square contents of a surface found ?
4. How many sq. ft. in a board 5 ft. long and 2 ft. wide ?
5. What are the square contents or area of a court 10 rods long and 4 rods wide ?
6. What is the area of a room 25 ft. long and 20 ft. wide ?
1. What is the length of a room that is 12 feet sq. ?
2. What is the length of a board that contains 20 square feet and is 2 feet wide ?
3. What is the width of a room that contains 120 square feet and is 12 feet long ?

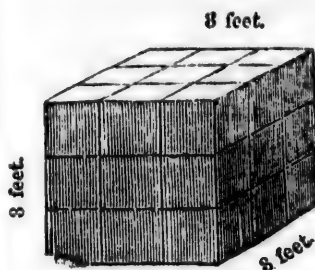
3 feet

7228
= 1
inc
wid
27 cu
40 cu
50 cu

A co
long, 3
pile is

1.
cubic
2.
3.
4.
high
5.
feet

1. I
2. V



In cubic measure, length, breadth, and thickness, are considered. A cubic yard is 3 feet long, 3 feet wide, and 3 feet thick, and is equal to $3 \times 3 \times 3 = 27$ cubic feet. Hence,

The solid contents of any body is found by multiplying together the length, breadth, and thickness.

7228 cubic inches (cub. in.)
 $= 12 \times 12 \times 12$, that is 12
 inches in length, 12 in
 width, and 12 in thickness, } make 1 cubic foot, cu. ft.
 27 cubic feet $= 3 \times 3 \times 3$ feet " 1 cubic yard, cu. yd.
 40 cubic feet of round timber or
 50 cubic feet of hewn timber " 1 ton, ton.

A cord of wood is a pile 4 feet high, 4 feet wide, and 8 feet long, $= 4 \times 4 \times 8 = 128$ solid feet. 1 foot in length of such a pile is called a cord foot; hence 8 cord feet make 1 cord.

1. State the difference between linear, square, and cubic measure.

2. What do you mean by a cubic yard?

3. How are the solid contents of a body found?

4. What are the solid contents of a block, 3 feet high, 2 feet wide, and 4 feet long?

5. How many solid yards in a wall, 3 feet high, 3 feet wide, and 100 yards long?

In 5 cubic yards, how many cubic feet?

1. In 54 cubic feet, how many cubic yards?

2. What is the width of a block, that contains 24 solid feet and is 3 feet high, and 4 feet long?

Circular or Angular measure is used in astronomical calculations for reckoning latitude and longitude, measuring angles, &c.

| | |
|-------------------------|--------------------------|
| 60 seconds (") | make 1 minute, marked '. |
| 60 minutes | " 1 degree, " °. |
| 60 degrees | " 1 sign, " s. |
| 12 signs or 360 degrees | " 1 circle, " c. |

Every circle is divided into 360 degrees, hence the length of a degree depends on the size of the circle.

TIME MEASURE.

| | |
|---------------------|----------------------------|
| 60 seconds (sec.) | make 1 minute, marked min. |
| 60 minutes | " 1 hour, " h. |
| 24 hours | " 1 day, " d. |
| 7 days | " 1 week, " wk. |
| 4 weeks | " 1 lunar month, " mo. |
| 13 lunar months, | } " 1 year, " y. |
| 12 calendar months, | |
| 52 weeks, or | |
| 365½ days, | |

The months are January, February, March, April, May, June, July, August, September, October, November, and December.

The number of days in each month may be remembered from the following lines:—

30 days hath September,
April, June, and November;
February hath 28 alone,
All the rest have thirty-one;
Except in leap year, at which time,
February's days are twenty-nine.

1. In 1 day, how many minutes?
2. In 20 weeks and 3 days, how many days?
3. In 1 lunar month, how many days?—minutes?

1. In 56 days, how many weeks and lunar months?
2. In 600 hours, how many days?
3. In 97 weeks, how many lunar months?

THE ROMAN NOTATION,

So called because it was used by the ancient Romans, employs seven capital letters, viz. :

One, five, ten, fifty, hundred, five hundred, thousand.

I V X L C D M

All other numbers are expressed by repeating or combining these. I, X, C, and M, only, can be repeated, and these but three times.

TABLE.

| | | | | | |
|-----------|----|------------|-----|-------------|---------|
| I..... | 1 | XV..... | 15 | CC..... | 200 |
| II..... | 2 | XVI..... | 16 | CCC..... | 300 |
| III..... | 3 | XVII..... | 17 | CD..... | 400 |
| IV..... | 4 | XVIII.... | 18 | D..... | 500 |
| V..... | 5 | XIX..... | 19 | DC..... | 600 |
| VI..... | 6 | XX..... | 20 | DCC..... | 700 |
| VII..... | 7 | XXX..... | 30 | DCCC..... | 800 |
| VIII..... | 8 | XL..... | 40 | CM..... | 900 |
| IX..... | 9 | L..... | 50 | M..... | 1000 |
| X..... | 10 | LX..... | 60 | MM..... | 2000 |
| XI..... | 11 | LXX.... | 70 | MMM..... | 3000 |
| XII..... | 12 | LXXX... 80 | | MDCCCLXVI.. | 1866 |
| XIII..... | 13 | XC..... | 90 | MXIV..... | 1014 |
| XIV..... | 14 | C..... | 100 | MXIV..... | 1014000 |

When a character precedes one of higher value it is to be subtracted ; as IV, four ; in all other combinations the sum of the characters is denoted ; as VI, six.

A dash over a character multiplies it by 1000 as \overline{V} , five thousand. Read XXIX ; LV ; XXXIX ; CI ; CCCXI ; XCIX ; MMCLI ; \overline{MXX} ; \overline{CIX} .

PAPER AND BOOKS.

A sheet folded into two leaves is called a folio, into 4 leaves a quarto, into 8 leaves an octavo, into 16 leaves a 16 mo, into 18 leaves an 18 mo, &c.

PAPER AND BOOKS.

| | |
|-----------------------|---------------|
| 24 sheets of paper | make 1 quire. |
| 20 quires | " 1 ream. |
| 2 reams | " 1 bundle. |
| 5 bundles or 10 reams | " 1 bale. |

MISCELLANEOUS TABLE.

| | |
|--------------------------|------------------|
| 12 units | make 1 dozen. |
| 12 doz. | " 1 gross. |
| 12 gross | " 1 great gross. |
| 20 units | " 1 score. |
| 14 pounds | " 1 stone. |
| 56 lbs. of butter | " 1 firkin. |
| 100 lbs. | " 1 quintal. |
| 200 lbs. of pork or beef | " 1 barrel. |
| 196 lbs. of flour | " 1 barrel. |

REDUCTION.

64. Reduction is the process of changing numbers from one denomination to another, without changing their value.

65. Reducing numbers from a higher to a lower denomination, as pounds to shillings, is called Reduction Descending.

66. The changing of numbers from a lower to a higher denomination, as pence to shillings, is called Reduction Ascending.

67. REDUCTION DESCENDING.

EXAMPLE.—Reduce £13 10s. to pence.

| | |
|-------|------------------------------------|
| £. s. | |
| 13 10 | £1 = 20s., £13 = 13 times 20s. |
| 20 | = 260s.; 260s. + 10s. = 270s. |
| 270 | 1s. = 12d.; 270s. = 270 times 12d. |
| 12 | = 3240 pence. |

3240 pence.

1. In \$500 how many cents ?
2. In \$7 how many mills ?
3. Reduce £1 to pence ;—to farthings.

To perform reduction descending,

RULE.—Multiply the highest given denomination by that number of the next lower that is contained in one of its units, adding in the given number, if any of the lower denomination ; reduce the result to the next lower denomination in the same manner, and continue the operation till the quantity is reduced to the required denomination.

PROOF.—By division.

1. Reduce to cents \$703 ;—\$72.70 ;—\$1000.
2. Reduce 7E. \$2 7 dimes, 9 cts. 2m. to mills.
3. Reduce \$25, \$91, \$.02½ to cents and mills.
4. Reduce £700 to shillings.
5. In £1080, how many pence ?
6. In £19 3s. 5d., how many pence ?
7. Reduce 17s. 10½d. to farthings.
8. Reduce £1760 19s. 6d. to farthings.
9. In 1 guinea, how many half pence ?
10. In 17 lbs. 2 oz., how many ounces and drams ?
11. In 25 cwt., how many pounds ?
12. Reduce 171 cwt. 3 lbs. to pounds and ounces.
13. Reduce 15 tons 17 cwt. 1 qr. 22 lbs. to drams.
14. Reduce 15 lbs. 6 oz. 12 dwts. 13 gr. to grains.
15. In 760 lbs. of silver, how many half ounces ?
16. Reduce 2 lbs. 2 oz. to scruples.
17. Reduce 117 lbs. 8 oz. 2 dr. 12 gr. to grains.
18. How many quarts and pints in 1 bushel ?
19. Reduce 17 bus. 1 pk. 1 pt. to pints.

1. In 1 hhd., how many quarts?
2. In 16 yds. 2 qr., how many quarters?
3. How many sq. feet in a floor 20 feet long and 15 feet wide?
20. What is the weight of 65 bushels 5 pounds of wheat, and 50 bushels of oats?
21. Reduce 3 hhd. 1 bar. 19 gal. 2 q. to pints.
22. How many quart bottles may be filled from 1 ton of wine?
23. In 350 pipes how many pints?
24. Reduce 975 yards to quarters and nails.
25. Reduce 17 yds. 3 qr. 3 na. $1\frac{1}{2}$ inches to inches.
26. Reduce 31 Fl. e. 3 na. to inches.
27. In 1 mile how many yards?—feet?
28. Reduce 5187 yds. 1 ft. to feet and inches.
29. Reduce 17 lea. 1 m. 2 fur. 7 rds. 1 ft. 6 in. to inches.
30. In 1 sq. mile, how many sq. feet?
31. Reduce 2 r. 16 sq. per. 19 yds. 8 ft. 121 in. to sq. inches.
32. Reduce 27 sq. m. 2 sq. yds., to sq. inches.
33. How many sq. are perches in a piece of land 200 rods long and 80 rods wide?
34. Reduce 3 cub. yds. 6 cub. ft. 222 cub. in. to cub. in.
35. In $12\frac{1}{2}$ cords of wood, how many solid feet?
36. How many solid feet in a crib of timber 20 feet long, 8 feet wide, and 10 feet high?
37. Reduce 1 lun. mo. 20 seconds, to seconds.
38. How many days from June 2nd to March 22nd?
39. How many days from Dec. 3rd to Feb. 29th?
40. Reduce 9s. $13^{\circ} 25'$ to seconds.
41. Express in the Arabic or common Notation, LIV, XLI, CV, MDV, DCCCIX, $\overline{\text{MMVI}}$, $\overline{\text{MDMCCXCVIII}}$.

68. EXAMPLE.—Reduce 3240 pence to pounds.

| | |
|--|---|
| <div style="display: flex; align-items: center;"> <div style="border-right: 1px solid black; padding-right: 5px; margin-right: 5px;">12</div> <div style="border-bottom: 1px solid black; padding: 0 5px;">3240d.</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border-right: 1px solid black; padding-right: 5px; margin-right: 5px;">20</div> <div style="border-bottom: 1px solid black; padding: 0 5px;">270s.</div> </div> <div style="margin-top: 5px;">£13 10s.</div> | <p>We reduce the pence to shillings by dividing by 12, because every 12 pence makes 1 shilling; $3240d. = 270s.$ We reduce the shillings to pounds by dividing by 20, because 20 shillings make 1 pound, and obtain £13 10s. the number of pounds in 3240 pence.</p> |
|--|---|

RULE.—Divide by that number of the given denomination that make 1 of the next higher denomination, and so on till the number is reduced to the required denomination.

The remainders are of the same name as their dividends.

1. How many dollars in 1000 cents?
2. Reduce 15000 mills to dollars?
3. Reduce 960 farthings to pounds.
4. How many shillings in 57d.?—98d.?—78d.?—87d.?—44d.?—29d.?

1. Reduce to dollars, 70300 cts., 7270 cts. and 100000 cs.
2. Reduce 72792 m. to cts., dimes, dollars, and eagles.
3. How many dollars in 25000 m., 91000 m., and 25 m.?
4. In 14000 shillings, how many pounds?
5. In 259200 pence, how many pounds?
6. Reduce 4601 pence to pounds.
7. Reduce 858 farthings to pence, shillings, &c.
8. Reduce 1690536 farthings to pounds.
9. Reduce 504 half pence to guineas.
10. In 4384 drams, how many pounds?
11. In 2500 lbs., how many hundred weights?
12. Reduce 273648 ounces to hundred weights.

ng and 15

ds of wheat,

ts.

from 1 ton

B.

o inches.

es.

in. to inches.

121 in. to sq.

hes.

e of land 200

in. to cub. in.

feet?

r 20 feet long,

nds.

ch 22nd?

. 29th?

otation, LIV,

CXCVIII.

1. What is Reduction ?
2. What is Reduction Descending ?—Ascending ?
3. How would you reduce pounds to farthings ?—
farthings to pounds ?—tons to ounces ?—ounces to tons ?
13. Reduce 8127232 drams to oz., lbs., etc.
14. Reduce 89581 grains to pounds.
15. Reduce 18240 half ounces to pounds.
16. Reduce 624 scruples to pounds.
17. Reduce 677892 grains to pounds.
18. In 64 pints, how many bushels ?
19. In 1105 pints, how many bushels ?
20. Of 5605 pounds of grain, 50 bushels are oats, the
remainder is wheat ; how many bushels of wheat
are there ?
21. Reduce 1920 pints to hogsheads.
22. In 1008 quarts of wine, now many tons ?
23. Reduce 352800 pints to pipes.
24. Reduce 3900 quarters to yards.
25. In 647 inches, how many yards ?
26. Reduce $843\frac{1}{2}$ inches to Fl. ells.
27. Reduce 5280 feet to miles.
28. Reduce 186744 inches to yards.
29. Reduce 3311964 inches to leagues.
30. Reduce 27878400 sq. ft. to sq. miles.
31. Reduce 3789481 sq. in. to sq. ft., yds., etc.
32. Reduce 108391221792 sq. in. to sq. miles.
33. A piece of land contains 16000 sq. perches, and is
200 rods long ; what is its breadth ?
34. Reduce 150558 cub. in. to cub. ft., cub. yd., etc.
35. In 1600 cub. feet, how many cords of wood ?
36. What is the length of a crib of timber that is 10 ft.
high, 8 ft. wide, and contains 1600 solid ft. ?

1. In 1280 cubic feet, how many cords of wood?
2. In 1670 seconds, how many hours?
3. What is the length of a room that is 25 feet wide, and contains 1000 sq. feet?
37. Reduce 2480420 seconds to lun. months.
38. A note is drawn on the 2nd of June, payable in 293 days; when will it be due?
39. When will a note become due, dated December 3rd, and drawn at 84 days?
40. Reduce 1020300 seconds to signs.
41. Express in Roman numerals 54, 41, 105, 1505, 809, 11006, 16298.

69. To reduce old Canadian money, (pounds, shillings, and pence) to the new or Decimal currency.

EXAMPLE.—Reduce £3, 16s. 6½d. to dollars and cents.

SOLUTION.—£1 = \$4; £3 = 3 times \$4 = \$12.

| | | | | |
|------|-----|----|---|-----------|
| £ | s. | d. | 1s. = 20c.; 16s. = 16 times 20c. = 320c. | |
| 3 | 16 | 6½ | 6d. | = 10c. |
| 4 | 20 | 5 | ½d. = 2 far. = 2 times ½c. = 1½c. = .00½. | |
| | | | | |
| 12 | 320 | 1½ | = ½ | \$15.30½. |
| 3.20 | | | | |

10
½

\$15.30½ Ans.

RULE.—Take four times the pounds as shillings; 20 times the shillings as cents; reckon 6 pence, 10 cents; 3 pence, 5 cents; 1½ pence, 2½ cents. The remaining pence and farthings, reduce to farthings; then to cents by multiplying them by ½ of a cent, the value of 1 farthing.

For, 3d. = 12 far. = 5 cts., hence 1 far. = ⅓ of 5 cts. = ⅓ ct.

1. Reduce £5, 5s. to dollars and cents.
2. How many cents in 1s. 6d.?—13s.?—9½d.?—7½d.?

Reduce to dollars and cents,

| | |
|------------------|---------------------|
| 1. £ 1 10s. 6d. | 7. £ 33 13s. 11½d. |
| 2. £17 1s. 9d. | 8. £190 17s. 10½d. |
| 3. £10 1s. 0½d. | 9. £295 16s. 8½d. |
| 4. £15 15s. 9½d. | 10. £180 0s. 7½d. |
| 5. £23 11s. 4½d. | 11. £190 0s. 6d. |
| 6. £17 17s. 7½d. | 12. £720 19s. 11½d. |

70. To reduce the Decimal Currency to pounds, shillings, and pence.

EXAMPLE.—Reduce \$25.87 to pounds, &c.

OPERATION.—\$25 ÷ \$1, the number of dollars in 1 pound, = £6 and \$1 rem.
 $4) \overline{25} \ 87$
 6.
 20) 187
 9. 7
 3
 5) 21
 4
 £6 9s. 4½d. Ans. 4½. = $\frac{3 \times 7}{5}$ = 4½d. Then add the results which equal £6 9s. 4½d.

RULE.—Take $\frac{1}{4}$ of the dollars as pounds, $\frac{1}{10}$ of the cents as shillings, and $\frac{1}{2}$ of the remaining cents as pence (since 5 cents = 3d. 1 cent = $\frac{1}{2}$ of 3d. = ½d.) 10 cents may be reckoned 6d.; 5 cents, 3d.; 2½ cts 1½d.

Reduce to pounds, shillings, &c., \$1, \$40, 40 cts., 80 cts., 15 cts., 5 cts., 2 cts.

Reduce to old Canadian money,

| | | |
|-------------|--------------|---------------|
| 1. \$ 6.10. | 5. \$47.16. | 9. \$460.13. |
| 2. \$68.35. | 6. \$71.52. | 10. \$ 71.15. |
| 3. \$40.21. | 7. \$126.09. | 11. \$190.91. |
| 4. \$38.37. | 8. \$377.18. | 12. \$876.99. |

11½d. ? — 7½d. ?

11½d.

10½d.

8½d.

7½d.

6d.

11½d.

to pounds,

dollars in 1
rem.

7 cts. = 187

the number

, = 9s. and

= 7 times ¾d.

then add the

6 9s. 4½d.

of the cents

pence (since

9 cents may

40, 40 cts.,

60.13.

71.15.

90.91.

76.99,

1. Reduce 7 m. 5 fur. 14 rd. 3 yds. 2 ft. 7 in. to lines.
2. In £7, 19s. 11½d., how many dollars and cents?
3. In 33395236 cub. in., how many tons of hewn timber?

4. In 100800 cub. feet, how many cords of wood?
5. In £50, how many three-pences?
6. Reduce £150, 10s. to four-pences.
7. In 20 half-guineas, how many 7 shilling pieces?
8. Reduce £1, 19s. 10½d. to cents.
9. How many cents will 27 lbs. 8 oz. of metal make?
10. In 70 E. ells, how many yards?
11. In 7 Fr. ells 1 qr., how many yards?
12. How many Fl. ells in 170 yds. 2 qrs.?
13. How many quart bottles may be filled from 4 hogsheads of wine?
14. How many powders of 3 grains each may be made from 1½ pounds of quinine?
15. In 16810 bushels of wheat, how many pounds?

1. In 5832372 lines, how many miles?
2. Reduce \$31.99 $\frac{7}{8}$ to pounds, &c.
3. Reduce 586 tons hewn timber, 25 ft. 1636 in. to
4. Reduce 787 cords 64 cub. ft. to cub. ft. [cub. in
5. In 4000 three-pences, how many pounds?
6. In 903 four-pences, how many pounds?
7. How many half-guineas in 30 seven-shilling pieces
8. Reduce \$7.97½ to the old Canadian currency.
9. What is the weight of \$27.50 in cents?
10. In 87 yds; 2 qrs., how many E. ells?
11. In 10 yds. 3 qrs., how many Fr. ells?
12. How many yards in 227 Fl. ells 1 qr.?
13. 1008 quarts = how many hogsheads?
14. 2880 powders of 3 grs. each = how many pounds?
15. 1008600 pounds = how many bushels of wheat?

71. Compound Addition is the addition of numbers of more than one denomination.

EXAMPLE.—Find the amount of £7, 17s., £9, 14s. 6½d., £8, 8s. 9½d., £3, 4s. 4½d., and £7, 7s. 3½d.

| £ | s. | d. |
|---|----|----|
| 7 | 17 | 0 |
| 9 | 14 | 6½ |
| 8 | 8 | 9½ |
| 3 | 4 | 4½ |
| 7 | 7 | 3½ |

£36 12 0½ sum.

£36 12 0½ proof.

Having written the addends with units of the same denomination under each other, we commence to add at the lowest denomination.—1—4—7—9 farthings =, divided by 4 the number of farthings in 1 penny, to 2 pence, and 1 farthing, or 2½d.; set down the ½d., and carry the 2 pence to the pence column. 2—5—9—18—24 pence =, divided by 12, the number of pence in one shilling, to 2 shillings; set down 0, there being nothing over, and carry 2 shillings. 2—9—13—21—25—32—42—52 shillings, = £2, 12s.; set down 12s., and carry the £2 to the column of pounds, which add as in simple numbers.

Compound addition differs from simple addition in the orders not increasing and diminishing in a uniform tenfold ratio. The same principle applies to all operations on compound numbers.

RULE.—Write the addends so that units of the same denomination may stand in the same vertical column. Add first the lowest denomination, reduce the sum to the next higher denomination, set down the remainder if any under the column added, and carry the units of the next order to their proper column. Proceed thus through all the denominations to the last, which add as in simple numbers.

PROOF.—As in simple numbers.

1.
a gra
cost?
2.
3.
+ 4

1. Peter paid 3 shillings for a fifth book, 2s. 6d. for a grammar, and 6 pence for a slate; what did the whole cost?

2. 13s. 6d. + 1s. 3d. + 9d. = how much?

3. What is the amount of 1 yd. + 3 yds. 2 ft. + 4 yds. 2 ft. 1 in.?

(1)

| £ | s. | d. |
|----|----|-----|
| 18 | 17 | 6½ |
| 18 | 19 | 11 |
| 19 | 12 | 10½ |
| 13 | 14 | 2½ |
| 19 | 15 | 3½ |
| 17 | 19 | 4½ |

(2)

| £ | s. | d. |
|----|----|-----|
| | | 7½ |
| | 15 | 0½ |
| 1 | 10 | 11½ |
| 16 | 16 | 6½ |
| 85 | 14 | 10½ |
| 60 | 17 | 9½ |

(3)

| £ | s. | d. |
|----|----|-----|
| 58 | 11 | 0 |
| 6 | 10 | 11½ |
| 46 | 15 | 10½ |
| 68 | 19 | 11½ |
| 93 | 8 | 7½ |
| 56 | 16 | 11½ |

(4)

| £ | s. | d. |
|----|----|-----|
| 9 | 7 | 6½ |
| 10 | 19 | 10½ |
| 11 | 18 | 9½ |
| 12 | 17 | 11½ |
| 13 | 16 | 8½ |
| 14 | 15 | 10½ |

(5)

| £ | s. | d. |
|----|----|-----|
| 98 | 17 | 7½ |
| 87 | 18 | 10½ |
| 76 | 19 | 11½ |
| 65 | 16 | 9½ |
| 48 | 18 | 10½ |
| 73 | 13 | 7½ |

(6)

| £ | s. | d. |
|-----|----|-----|
| 254 | 14 | 11½ |
| 715 | 18 | 10½ |
| 916 | 15 | 5½ |
| 175 | 10 | 7½ |
| 89 | 13 | 4½ |
| 7 | 19 | 7½ |

(7)

| £ | s. | d. |
|-----|----|-----|
| 328 | 14 | 7½ |
| 800 | 17 | 5½ |
| 407 | 12 | 8½ |
| 670 | 18 | 10½ |
| 598 | 0 | 10½ |
| 742 | 8 | 11½ |
| 967 | 17 | 11½ |
| 864 | 18 | 11½ |

(8)

| £ | s. | d. |
|-----|----|-----|
| 476 | 16 | 6½ |
| 567 | 18 | 8½ |
| 678 | 19 | 11½ |
| 789 | 17 | 10½ |
| 890 | 15 | 4½ |
| 910 | 13 | 3½ |
| 678 | 8 | 11½ |
| 497 | 7 | 5½ |

(9)

| £ | s. | d. |
|-----|----|-----|
| 816 | 17 | 8½ |
| 389 | 0 | 10½ |
| 31 | 17 | 11 |
| 346 | 18 | 6½ |
| 407 | 13 | 8½ |
| 748 | 11 | 11 |
| 567 | 14 | 4½ |
| 687 | 15 | 10½ |

1. What is a simple number?—a compound number?
2. What is compound addition?
3. How does compound differ from simple addition?
4. How do you add compound numbers?
5. How much is 7 tons + 3 tons 16 cwt. + 15 cwt.?

| (10) | | | | (11) | | | (12) | | |
|------|------|-----|-----|------|------|-----|------|-----|-----|
| t. | cwt. | lb. | oz. | pks. | gal. | qt. | yd. | ft. | in. |
| 13 | 13 | 80 | 4 | 3 | 1 | 3 | 17 | 2 | 11 |
| 90 | 17 | 45 | 3 | 6 | 1 | 2 | 20 | 2 | 10 |
| 16 | 14 | 19 | 14 | 3 | 0 | 3 | 8 | 1 | 8 |
| 16 | 17 | 10 | 10 | 2 | 0 | 1 | 2 | 7 | |
| 39 | 9 | 90 | 12 | 19 | 1 | 2 | | | |

13. A man sold on Monday, 456 yds. 3 qr. 2 na.; on Tuesday, 386 yds. 3 qr. 3 na.; Wednesday, 648 yds. 2 qr. 2 na.; Thursday, 139 yds. 3 qr. 1 na.; Friday, 758 yds. and Saturday, 827 yds. 8 qr.; how much did he sell in the week?
14. A farm consisted of five fields; the first measured 24 a. 3 r. 37 per.; the 2nd, 18 a. 2 r. 19 per. 10 yds.; the 3rd, 27 a. 1 r. 12 per. 9 yds.; the 4th, 15 a. 3 r. 32 per.; the 5th, 21 a. 2 r. 25 per. 20 yds.; how many acres were in the field?
15. Add together, 1 c. 7 c. ft. 12 cub. ft., 14 c. 2 c. ft. 13 cub. ft., 75 c. 7 c. ft. 9 cub. ft. 90 c. 10 cub. ft. and 78 c. 6 c. ft. 11 cub. ft.
16. What is the amount of 40 wks. 3 d. 1 h. 5 m. + 16 wks. 6 d. 4 m. + 27 wks. 5 d. 2 h.?
17. What is the amount of 2 a. 75 p. 248 sq. ft. 72 sq. in. + 3 a. 120 sq. ft. 3 r.; 177 sq. ft. 85 sq. in. + 15 a. 17 per. 84 sq. ft. 80 sq. in.?

ound number?

ple addition?

rs?

wt. + 15 cwt.?

(12)

yd. ft. in.
17 2 11
20 2 10
8 1 8
2 7

qr. 2 na.; on

ednesday, 648

ds. 3 qr. 1 na.;

327 yds. 8 qr;

?

first measured

19 per. 10 yds.;

the 4th, 15 a.

5 per. 20 yds.;

?

, 14 c. 2 c. ft.

90 c. 10 cub.

l h. 5 m. + 16

?

8 sq. ft. 72 sq.

ft. 85 sq. in.

?

72. EXAMPLE.—Ellen purchased a hat at 18s. She gave a £5 note in payment; what change must she receive?

SOLUTION.—She will have the difference between £5 and 18s.; from £5 borrow £1 = 20s.; 18s. from 20s. leave 2s. She will receive £4, 2s. in change.

2. 3 yds. 2 qrs. — $1\frac{1}{2}$ yds = what?

3. From £10 18s. $2\frac{1}{2}$ d. take 18s. $3\frac{1}{2}$ d.

OPERATION.— $\frac{1}{2}$ d. — $\frac{1}{2}$ d. (2 far. — 1 far.) = $\frac{1}{2}$ d.; we cannot take $\frac{1}{2}$ d. from $\frac{1}{2}$ d., borrow from 18s., 1s. = 12d.; 12d. + $\frac{1}{2}$ d. — $\frac{1}{2}$ d. = 11d.; 18s. + 1s. (the one borrowed) from 18s. we cannot; borrow from £10, £1, = 20s., 20s. + 18s. — 19s. = 19s.; £10 — £1 = £9.

RULE.—Write the subtrahend under the minuend with units of the same denominations under each other. Subtract each denomination of the subtrahend from the one above it, commencing at the lowest denomination. If any denomination of the subtrahend be greater than the corresponding number of the minuend, borrow 1 unit of the next higher denomination, reduce it to the lower denomination, add it to that, and subtract as before; call the number from which you borrowed less 1, or the one borrowed may be included in the next figure of the subtrahend and thus subtracted from the upper.

PROOF.—As in simple numbers.

(1)
£ s. d.
19 12 $6\frac{1}{2}$
19 $4\frac{1}{2}$

(2)
£ s. d.
900 1 $10\frac{1}{2}$
98 12 $9\frac{1}{2}$

(3)
£ s. d.
1 0 3
0 $\frac{1}{2}$

(4)
£ s. d.
296 3 $8\frac{1}{2}$
172 12 $7\frac{1}{2}$

(5)
£ s. d.
314 10 $4\frac{1}{2}$
275 14 $5\frac{1}{2}$

(6)
£ s. d.
715 14 0
620 15 $6\frac{1}{2}$

1. £1 — $\frac{1}{4}$ d. = how much?
2. Bought a hat at 10s., gloves at 5s. 6d., paid a pound note; how much change is due?
3. How do you subtract compound numbers?

| (7) | | | (8) | | | | (9) | | |
|------|-----|-----|-----|------|-----|-----|-----|----|----|
| cwt. | qr. | lb. | m. | fur. | rd. | yd. | y. | d. | h. |
| 17 | 3 | 20 | 7 | 7 | 2 | 3 | 17 | 24 | 12 |
| 8 | 3 | 24 | | 7 | 38 | 4 | | 29 | 19 |

10. From 29 lbs. 10 oz. 2 drs. 1 scr., take 9 lbs. 10 oz. 7 drs.
 11. From 16 yds. 2 ft. 10 in., take 6 yds. 2 ft. 11 in.
 12. 1 acre — 1 perch = how much?
 13. From 18 c. yds. 20 c. ft. 183 c. in., take 1000 c. in.
 14. From $19\frac{1}{2}$ yards of cloth, cut a coat pattern of 2 yds. 2 qrs. 2 na.; how much is left?
 15. The circumference of the globe — 45° = how much?
 16. A man sold 50 gallons from a tun of wine; how much was left?
 17. A young man had in the saving's bank £750, 10s. He drew at different times the sums of £8, 18s. $8\frac{1}{4}$ d., £19 13s. $2\frac{1}{4}$ d., and £27, 6s. $3\frac{1}{4}$ d.; how much had he remaining?
 18. Lent 1000 guineas, and received back £680, 15s.; how much is still due?
 19. 1000 yds. — [250 yds. 3 qrs. + 78 yds. + 100 yds. 1 qr. — 950 yds. 3 qrs.] = how much?
- NOTE.—The numbers within the brackets must be considered as but one quantity.
20. How much does 3 pks. 1 gal. 3 qts. lack of 1 bushel?
 21. What sum subtracted from 1 sovereign, will leave 3 crowns, 3 shillings and 3 pence?
 22. From 25 cords of wood was sold 13 c. 4 c. ft., and 9 c. 6 c. ft.; what quantity of wood is left?

73. EXAMPLE.—What is the cost of 9 books at 3s. 3d. each?

SOLUTION.—9 books at 3s. 3d. a piece will cost 9 times

$$\begin{array}{r} \text{s. d.} \\ 3 \quad 3 \\ 9 \\ \hline \end{array} \quad \begin{array}{l} 3\text{s. 3d.}; \quad 3\text{d.} \times 9 = 27\text{d.} = 2\text{s. 3d. 9 times} \\ 3\text{s.} = 27\text{s. which added to 2s. 3d.} \\ = 29\text{s. 3d.} = \text{£1, 9s. 3d.} \end{array}$$

2. What cost 15 sheep at £1, 5s. each?

3. What is the weight of 3 pigs, each weighing 1 cwt. 50 lbs?

4. What is the value of 12 articles at 1d. each?—
at 2d.?—at 9d.?—at 7d.?

5. What is the price of 24 articles at 4d. each?

SOLUTION.—12 articles at 1d. = 12d. = 1s.; 12 articles at 4d. = 4s.; 24 will cost 2 times 4s. = 8s.

6. At 5d. a yard what would be the cost of 36 yards?
—of 48 yards?—of 60 yards?—of 120 yards?—
of 1200 yards?

RULE.—Multiply all the denominations of the multiplicand separately, commencing at the lowest by the multiplier; reduce each product to the next higher denomination, and carry as in addition.

When the multiplier exceeds 12, and is a composite number, multiply by the factors of the multiplier.

Find the value of,

- | | |
|-------------------------|--------------------------------|
| 1. £14 6s. 7½d. × 7. | 13. £13 17s. 1½d. × 35. |
| 2. £ 9 8s. 4½d. × 8. | 14. £ 9 8s. 10½d. × 27. |
| 3. £74 18s. 11½d. × 9. | 15. £13 11s. 5½d. × 42. |
| 4. £18 0s. 11½d. × 10. | 16. £ 0 17s. 11½d. × 56. |
| 5. £17 8s. 0½d. × 5. | 17. £ 1 15s. 5½d. × 77. |
| 6. £ 4 6s. 7½d. × 6. | 18. £ 4 5s. 3½d. × 840. |
| 7. £ 0 9s. 4½d. × 12. | 19. £ 8 7s. 7½d. × 1080. |
| 8. £70 0s. 11½d. × 11. | 20. 7 cwt. 2 qrs. 18 lbs. × 9. |
| 9. £19 13s. 7½d. × 4. | 21. 15 lbs. 13oz. 8 drs. × 11. |
| 10. £12 13s. 0½d. × 21. | 22. 271 gal. 3 pt. × 22. |
| 11. £35 0s. 7½d. × 22. | 23. 8 a. 2 r. 14 sq. per. × 8. |
| 12. £23 15s. 0½d. × 24. | 24. 5 d. 17 h. 37 m. × 121. |

1. What cost 20 yards at 1s. a yard?—at 3s.?—
at 9s.?—at 19s.? What cost 40 yards at 10s.?—
at 70s.?

25. Find the value of 144 dozen eggs at 7½d. per dozen.

26. " " 99 tin pans at 1s. 2½d. each.

74. When the multiplier exceeds 12 and is not a composite number,

RULE.—Resolve the multiplier into any convenient parts, as units, tens, &c., multiply by these several parts, and add together the products.

1. What cost 563 yards at 15s. 7d. per yard?

OPERATION.— $563 = 500 + 60 + 3 = 10 \times 10 \times 5 + 10 \times 6 + 3$.

$$\begin{array}{r} £0\ 15\ 7 \times 3 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 7\ 15\ 10 \times 6 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 77\ 18\ 4 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 389\ 11\ 8 \text{ price of } 500 \text{ yds.} \\ 46\ 15\ 0 \quad " \quad 60 \quad " \\ 2\ 6\ 9 \quad " \quad 3 \quad " \\ \hline 438\ 13\ 5 \quad " \quad 563 \quad " \end{array}$$

RULE 2.—Multiply by the nearest composite number, and add to, or subtract from the product, so many times the multiplicand as the assumed composite number is less or greater than the given multiplier.

Find the value of,

- | | |
|--------------------------|------------------------------|
| 2. £16 18s. 4½d. × 52. | 9. £1 5s. 0½d. × 7081. |
| 3. £ 6 11s. 3 d. × 65. | 10. £6 7s. 8½d. × 9008. |
| 4. £ 0 10s. 11½d. × 360. | 11. 850 cwt. 16 lbs. × 999.* |
| 5. £ 7 18s. 0½d. × 59. | 12. 60 rds. 4 ft. × 354. |
| 6. £37 12s. 3½d. × 79. | 13. 5 dwt. 9 grs. × 436. |
| 7. £27 14s. 5½d. × 103. | 14. 5 d. 17 h. 44 m. × 137. |
| 8. £ 7 13s. 7½d. × 348. | 15. \$178.90 × 100000. |

* Multiply by 1000 and subtract once the multiplicand.

75. EXAMPLE.—If 3 books cost 2 shillings, what is the price of 1 book?

SOLUTION.—If 3 books cost 2s., 1 book will cost $\frac{1}{3}$ of 2s., 2s. \div 3 = 24d.; $\frac{1}{3}$ of 24d. = 8d. Therefore 1 book will cost 8d.

2. What cost 1 pair of scissors at £1 4s. per doz.?

3. If 4 acres of land cost £75 7s., what is the price per acre?

SOLUTION.—1 acre would cost $\frac{1}{4}$ of £75 7s. $\frac{1}{4}$ of £75

£ s. d. = £18 and £3 = 60s. remaining;

4) 75 7 0 60 + 7s. = 67s.; $\frac{1}{4}$ of 67s. = 16s.

and 3s. = 36d. over; $\frac{1}{4}$ of 36d. = 9d.

Ans. 18 16 9 1 acre would cost £18 16s. 9d.

RULE.—Divide the highest denomination as in simple numbers, reduce the remainder to the next lower denomination, adding in the given number of that denomination if any; divide again and proceed in the same manner to the lowest denomination. The quotient is of the same denomination as the dividend.

When the divisor is a composite number, divide successively by its factors.

PROOF.—As in simple numbers.

Find the value of,

- | | |
|--------------------------|----------------------------|
| 1. £100 6s. 4½d. ÷ 7 | 11. £770 13s. 3½d. ÷ 22. |
| 2. £ 75 6s. 10d ÷ 8. | 12. £570 1s. 6d. ÷ 24. |
| 3. £674 10s. 7½d. ÷ 9. | 13. £484 19s. 4½d. ÷ 35. |
| 4. £180 9s. 9½d. ÷ 10. | 14. £255 0s. 2½d. ÷ 27. |
| 5. £ 87 0s. 3½d. ÷ 5. | 15. £570 1s. 3d. ÷ 42. |
| 6. £ 25 19s. 9d. ÷ 6. | 16. £ 50 6s. 10d. ÷ 56. |
| 7. £ 5 12s. 3d. ÷ 12. | 17. £136 8s. 8½d. ÷ 77. |
| 8. £770 10s. 6½d. ÷ 11. | 18. £3581 2s. 6d. ÷ 840. |
| 9. £ 78 14s. 7d. ÷ 4. | 19. £9050 12s. 6d. ÷ 1080. |
| 10. £265 14s. 3½d. ÷ 21. | 20. 69 cwt. 12 lbs. ÷ 9. |

1. Paid £7, 10s. for 15 books; what cost 1 book?
2. What cost 1 article at 1s. a dozen?—at 3s.?

$$21. 174 \text{ lbs. } 4 \text{ oz. } 4 \text{ drs. } \div 11. \quad 23. 68 \text{ a. } 2 \text{ r. } 32 \text{ p. } \div 8.$$

$$22. 5970 \text{ gal. } 1 \text{ qt } \div 22. \quad 24. 693 \text{ d. } 19 \text{ h. } 37 \text{ m. } \div 121$$

25. What cost 1 doz. eggs at £4, 7s. for 144 doz.?
26. 99 tin pans cost £6, 1s. 8½d.; what is the price of 1 pan?

76. When the divisor exceeds 12, and is not a composite number:

RULE.—Divide by long division as follows:

1. Divide £4561, 15s. 9½d. by 87.

$$\begin{array}{r} \text{£} \quad \text{s.} \quad \text{d.} \quad \text{£} \quad \text{s.} \quad \text{d.} \\ 87 \overline{) 4561 \text{ } 15 \text{ } 9} \begin{array}{l} 52 \quad 8 \quad 8 \text{ quotient.} \\ 8 \times 11 - 1 = 87 \end{array} \\ \underline{435} \end{array}$$

$$\begin{array}{r} 211 \quad 419 \quad 9 \quad 1 \times 11 \\ 174 \\ \hline 37 \quad 4614 \quad 2 \quad 8 \quad + \text{ 21d. rem.} \\ - 52 \quad 8 \quad 8 \\ \hline 20 \end{array}$$

$$4561 \text{ } 15 \text{ } 9 \text{ proof.}$$

$$\begin{array}{r} 755 \\ 696 \\ \hline \end{array}$$

$$\begin{array}{r} 59 \\ 12 \\ \hline \end{array}$$

$$\begin{array}{r} 717 \\ 696 \\ \hline \end{array}$$

$$21$$

We divide the pounds by 87, and obtain £52, and £37 remaining, which we reduce to shillings, adding in the 15s., and again divide by 87; we reduce the remainder to the next lower denomination, and divide again, and proceed in the same way to the end.

2. £879 15 6 ÷ 52.
3. £426 11 3 ÷ 65.
4. £197 5 0 ÷ 360.
5. £ 466 3 2½ ÷ 59.
6. £2971 12 8½ ÷ 79.
7. £2855 7 0¼ ÷ 103.

1. Divide £16, 19s. 3½d. by 1s. 6½d.
2. £87, 6s. 8d. = how many times £1, 7s. 3½d.?
3. How often will a cart wheel, 10 ft. 6 in. in circumference, turn in 1 mile?
4. A lot of land containing 8 acres is 80 rods long; what is its width?
5. How many parcels of 3½ lbs. can be made of 2 cwt.?
6. 37½ yards of cloth will make how many coats, each requiring 4 yds. 2 qrs. 3 na.?

REVIEW OF COMPOUND NUMBERS.

1. What is the difference between simple and compound numbers? 62. 63.
2. How do the denominations of compound numbers differ from the orders of simple numbers? 71.
3. What is reduction descending, and how is it performed? 65. 67.
4. What is reduction ascending, and how performed? 66. 68.
5. How do you add compound numbers, and of what denomination is the sum? 71.
6. How do you subtract compound numbers? 72.
7. How do you multiply compound numbers? 73.
8. How do you multiply by a composite number? 73.
9. How do you multiply by a number exceeding 12, that is not composite? 74.
10. How do you divide a denominate number by an abstract number? Of what denomination is the quotient? 75.
11. How do you divide by a composite number?—by a number exceeding 12 that is not composite? 75.
12. How do you divide a denominate number by a denominate number? Of what name is the quotient? 76.

1. If 5 yards of cloth cost £1, 10s.; what will 15 yards cost?

SOLUTION.—If 5 yds. cost £1, 10s., 1 yd. will cost $\frac{1}{5}$ of £1, 10s.
 $\text{£1, 10s.} = \frac{\text{£1, 10s.}}{5} \times 3$, and 15 yds. will cost 15 times as much = $\frac{\text{£1, 10s.} \times 15}{5} = \text{£4, 10s.}$

2. If 9 yds. of cloth cost £2, 2s., what will 6 yds. cost?

3. If 2s. 6d. will pay for 3 yards of cotton, how much can be bought for 10s.?

SOLUTION.—If 1s. 8d. = 20d. pay for 3 yds., 1d. will pay for $\frac{1}{20}$ of 3 yds. = $\frac{3}{20}$ yds., and 10s. = 120d., will pay for 120 times $\frac{3}{20}$ = $\frac{3 \text{ yds.} \times 120}{20} = 18 \text{ yds.}$ Ans.

4. How much tea may be bought for £1 4s., when 2 pounds cost 6 shillings?

78. When a term of both dividend and divisor is of different denominations, they must be reduced to the lowest denomination contained in either. (In comparing the terms to make the statement, the inferior denominations may be disregarded.)

1. If 6 yards of cloth cost £4, 10s., what will 30 yards cost?

2. If 30 yards cost £22, 10s., what will 6 yards cost?

3. If I pay £4, 10s. for 6 yards of cloth, how many yards can I buy for £22, 10s.

4. If 30 yds. cost £22, 10s., how many yards will I get for £4, 10s.?

5. If 148 acres of land cost £119, 10s., what will 111 acres cost?

6. If 36 tons of logwood cost £316, 7s. 3d., what will 4 tons cost?

120 ANALYSIS IN COMPOUND NUMBERS.

1. If 2 oz. of tea cost 1s., what will 1 lb. 2 oz. cost?
2. What is the cost 5 lbs. of beef, at £1 10s. per cwt.?
7. If £89, 12s. 6d. be paid for 111 acres of land, how many acres can be bought for £119, 10s.?
8. What is the cost of 3 cwt. 25 lbs. of sugar at \$6.50 per cwt.?
9. If 36 a. 3 r. of land are rented for \$168, what should be the rent of 21 a. 3 r. 20 per.?
10. How much cloth can be bought for £2 8s. at the rate of 50 cts. for $1\frac{1}{4}$ yds.?
11. If $7\frac{1}{4}$ lbs. of sugar cost 6s. $1\frac{1}{4}$ d., what will $1\frac{1}{2}$ cwt. cost?
12. If 4 casks of vinegar contain 63 gal. 3 qrt., what will be the contents of 37 casks?
13. What is a man's wages for 146 days at the rate of £37 4s. 1d. per annum?
14. Paid £9 for 6 cwt. 96 lbs. of flour, what quantity can be bought for £5 18?
15. How many yards of cloth at 15s. are equivalent in value to 24 reams of paper at 17s. 6d. per ream?
16. If 3 quarters of a yard of cloth cost 1 guinea, what will three pieces each $25\frac{1}{2}$ yds. cost?
17. If a man feed to his stock in 7 months 41 bu. 3 pk. 4 qt. 1 pt. of grain, how much is required for 7 years?
18. How much cheese at £4 13s. 4d. per cwt. can be bought for £25?
19. How many yards of carpeting 1 yard wide will cover a floor 25 ft. long 21 ft. wide?
20. There is a certain pile of wood 120 ft. long, 6 ft. high, and 4 feet wide, what is its value at \$2.50 per cord?

1. Divide 6 pence between Hal and Hattie, and give Hal 1 farthing more than Hattie.

2. What number is that from which if 375 be taken the remainder will be 187?

3. Printing was invented in 1440; how long is it since?

1. The sum of two numbers is 1876, their difference nothing; what are the two numbers?

$$2. \text{ Find the value of } \frac{72 \times 96 \times 70}{48 \times 21 \times 9} + \frac{70 \times 90}{100}.$$

3. Find the sum in dollars and cents of one crown, 1 pound, 1 guinea, 1 shilling, and 1 penny?

4. What is the value of 35 barrels of soap, each 254 pounds, at 4½d. per pound?

5. How many bushels of wheat at \$1.50, must be given for 15 yards of cloth worth 2s. 3d. per yard?

6. A jeweller sold jewels to the value of £1200, for which he received in part 876 French pistoles, at 16s. 6d. each; what sum remains unpaid?

7. If I buy books at 12½ cents, and sell them at 15 cents, how much will I gain by the sale of 10000?

8. Bought 3 boxes of shoes each containing 52 pairs, for £33, 3s., if the whole are sold at \$1.25 per pair, what is gained by the transaction?

9. A. has 24 cows worth 108s. a head, and B. has 7 horses worth £23 each; if they interchange their droves, how much will make good the difference?

10. A man's yearly income is £500, and his daily expenses £1, 3s. 6½d.; what does he save?

11. A man earns £1, 13s. a week, and his daily expenses are 3s. 10½d., what does he lay up in a year?

1. At 4 cts. per pound, what will 100 barrels of pork amount to?
2. How many yards of cloth at \$2 must be given for for 3 cwt. of cheese at $12\frac{1}{2}$ cts. per pound?
3. How many barrels of flour at £1, 10s. will amount to £30?
12. What is the value of $166\frac{1}{2}$ gallons of vinegar at 3s. 9½d. per gallon?
13. If $809\frac{1}{4}$ acres of land cost £1955, 13s. 9d., what is the price per acre?
14. How many yards of cloth at \$3.50 can I have for 13 cwt. 56 lbs. of wool worth 2s. 4d. per pound?
15. From 7 cheeses each weighing 1 cwt. 61 lbs., how many allowances for seamen may be cut each weighing 5 oz. 7 drs.?
16. What is the value of 179 hogheads of tobacco, each weighing 13 cwt. at £2, 7s. 1d. per cwt.?
17. Divide \$100 between A. and B. giving A. 99 cents more than B.
18. The less of two numbers is 460, their difference 365, what is their sum and product?
19. 1870744 is the product of two factors, 2468 is one factor; what is the other?
20. If 283950000 be dividend, and 75000 the quotient, what will be the divisor?
21. What number divided by 10 mills will give 1879?
22. Two persons take a train at Montreal at the same time, and travel westward, one at the rate of 18 miles an hour, and the other at 25 miles; how far apart will they be at the end of 12 hours?
23. What is the value of 3 tons, 7 cwt. 60 lbs. 8 oz. of metal in cent pieces?

1. W
6d. ? —
2. A
— of
3. W
4. Thir
1s. 9d.
24. Ho
25. In
26. Di
27. A
28. If
29. V
30. I
31. I
32.

1. What cost 12 articles at 1d. each?—at 2d.?—6d.?—1s. 3d.?
2. At 4 pence each, what is the cost of 24 articles?—of 36 articles?
3. What is the cost of 5 Second readers at 5d. each, 4 Third readers at 1s. 3d., and 6 Fourth readers at 1s. 9d.?
24. How many half pence in 6247 crowns?
25. In 74962 E. ells, how many Fr. ells?
26. Divide \$1875 among three persons giving one exactly \$75.99 more than each of the others.
27. A and B bought a quantity of wine for \$340, of which A paid 3 times as much as B; how much did each pay?
28. If 28 casks contain 227 gal. 4 pt., what will 7 of them contain?
29. What is the assessment on \$87689.50 at 3 cents in the dollar?
30. If 1500 men have provisions for 15 days, how many men would the same quantity serve 36 days?
31. M. White bought of Murray & Co., Montreal: 15 tons of iron at £17, 5s. per ton, 70 hoes at 3s. 3d., 115 rakes at 11d., 40 pitchforks at 5s. 2d., 25 shovels at 6s. 3d., 88 spades at 4s. 6d., 50 ploughs at £3, 10s., 15 horse rakes at £1, 15s., 5 threshing mills at £40; what did the whole amount to?
32. A merchant had £19118 to begin trade with: for 5 years together he cleared £1086 a year; the next 4 years he made good £2715, 10s. 6d. a year; but the following years he lost one year with another £475, 4s. 6d. a year. What was his fortune at the 12 years' end?

ADDITION.

| | | |
|-------------------|----------------|------------------|
| 90. 73618. | 164. 336510. | 191. 1300 bu. |
| 91. 4650. | 165. 701360. | \$612 cost. |
| 92. \$1675. | 166. 459752. | 192. 1916 lbs. |
| 105. 66439 trees. | 167. 343. | 193. 3846453109. |
| 114. 73618. | 168. \$337. | 194. 286615495. |
| 115. 4560. | 177. 14700. | 195. 129533167. |
| 116. 239. | 178. 4280. | 196. 238810. |
| 139. 68. | 179. 768790. | 197. 411058. |
| 140. 918 acres. | 184. 2768. | 198. 600 lbs. |
| 149. 1021. | 185. 278538. | 199. \$380. |
| 150. \$525. | 186. 258611. | 201. 883994. |
| 151. \$11064. | 187. 88521007. | 202. 2957. |
| 152. 47296. | 188. \$27067. | 203. 324628. |
| 153. 26199. | 189. \$2738. | 204. 1011098. |
| 158. 135. | 190. \$4200. | 205. 296984. |
| 163. 431321. | | 206. 1718885520. |

ADDITION OF THE DECIMAL CURRENCY.

| | | |
|---------------|----------------|--------------------|
| 1. \$805.92. | 5. \$34013.34. | 8. \$6250. |
| 2. \$5414.69. | 6. \$866.15. | 9. \$1386.96. |
| 3. \$3866.97. | 7. 1325 bu. | 10. \$17188855203. |
| 4. \$3065.87. | \$851.50. | |

SUBTRACTION.

| | | |
|------------------|-----------------|--------------------|
| 109. 1081. | 136. \$890. | 147. 6999. |
| 110. 1499856. | 137. 1943 lbs. | 148. 12769. |
| 127. 158 sheep. | 138. 32464. | 149. 884374. |
| 128. 69273. | 139. 846889. | 150. 879687. |
| 129. 369347231. | 140. 9202293. | 151. 671. |
| 130. 14373. | 141. 1548771. | 152. \$179. |
| 131. 1244 yds. | 142. 740. | 153. 374y. to 1866 |
| 132. 60450060196 | 143. 1708. | 155. 5320. |
| 133. 397902. | 144. \$1673. | 156. 140000000. |
| 134. 9990000000. | 145. \$1090. | 157. 2780. |
| 135. 13328591. | 146. \$30 loss. | 158. 1800000. |

SU

1. \$98.92
 2. \$4.91.
 3. \$2468.
 4. \$1729
 83. 2226
 84. 1511
 85. 1871
 86. 9723
 87. 1587
 88. 1883
 89. \$896
 90. 720
 91. 120.
 96. 8738
 97. 473
 98. 587

64. \$32
 65. 166
 70. 27
 71. \$1
 72. 77
 73. \$9
 74. 12
 75. 54
 76. 23
 89. 76
 90. 24
 96. 61
 97. 1
 98. 1
 2. 96
 3. 87
 4. 28

SUBTRACTION OF THE DECIMAL CURRENCY.

| | | |
|----------------|---------------|----------------|
| 1. \$98.92. | 5. \$7310.34. | 8. \$5935.50. |
| 2. \$4.91. | 6. \$284.95. | 9. \$29533.50. |
| 3. \$2468.88. | 7. \$20.28. | 10. \$2.36. |
| 4. \$17296.30. | | |

MULTIPLICATION.

| | | |
|---------------|--------------|--------------------|
| 83. 2226120. | 99. 168. | 115. 864864. |
| 84. 15116850. | 100. \$676. | 117. \$939. |
| 85. 18712260. | 101. \$1750. | 118. 5475 cts. |
| 86. 972360. | 102. \$450. | 119. 171000. |
| 87. 158760. | 103. 158742. | 120. 748 days. |
| 88. 1883. | 104. 1120. | 121. \$59000. |
| 89. \$896. | 105. \$387. | 122. 4320000 pins |
| 90. 720 yds. | 111. 38304. | 123. 3650 days. |
| 91. 120. | 112. 2242. | 124. 16211612. |
| 96. 8738496. | 113. 70116. | 125. 17920s. |
| 97. 473760. | 114. 90985. | 126. \$95 in debt. |
| 98. 5877. | | |

Division proves Multiplication.

DIVISION.

| | |
|------------------------------|--------------------------------------|
| 64. \$329. | 99. 7899643311. |
| 65. $166\frac{1}{2}$ acres. | 100. 166311402. |
| 70. 27 marbles. | 101. 27 hats. |
| 71. \$18 $\frac{1}{2}$. | 102. 362128 + . |
| 72. 774 bags. | 103. 15 sheep. |
| 73. \$969966 $\frac{2}{3}$. | 114. \$16 $\frac{3}{4}$. |
| 74. 12525 $\frac{1}{2}$. | 115. C. 50, E. 25, K. 25. |
| 75. 54 sheep. | 116. 132 canisters. |
| 76. 23 coats, 2 yards rem. | 117. 0. |
| 89. 76093. | 118. $1175\frac{1}{2}$ bags of each. |
| 90. 244 $\frac{1}{2}$ trees. | 119. 1000. |
| 96. 61537 + . | 120. 559248074824 $\frac{3}{4}$. |
| 97. 121067 + . | 121. \$12750. |
| 98. 181601. | |

GENERAL PRINCIPLES.

| | | |
|---------|----------------------|------------|
| 2. 96. | 5. 8. | 8. 36 lbs. |
| 3. 87. | 6. 1584. | 9. 16 cts. |
| 4. 280. | 7. 7 $\frac{1}{2}$. | |

MISCELLANEOUS EXERCISES IN PRECEDING RULES.

| | | |
|-----------------|----------------------------|------------------|
| 1. 6250 lbs. | 8. 1541. | 16. 81. |
| 2. 90906. | 9. 850. | 17. 89099. |
| 3. \$427.05. | 10. 40 qt. | 18. 13255. |
| 4. 1000 times. | 11. 85 cts. | 19. 62634005490. |
| 5. 57755 sq. m. | 12. 62 $\frac{1}{2}$ tons. | 20. 378600. |
| 6. £11000. | 14. 1273989. | 21. \$253.75. |
| 7. 9 yards. | 15. 70 yards. | |

22. 12 cents per pair, \$17.28 whole gain.

BILLS.

| | | |
|-----------------------------|--------------|---------------------------|
| 1. \$109.84 $\frac{1}{2}$. | 2. \$149.44. | 3. \$205.02 $\frac{1}{2}$ |
|-----------------------------|--------------|---------------------------|

ANALYSIS.

| | | |
|----------------------------|---------------------------|------------------------------|
| 4. 170. | 27. \$1989.792. | 46. 286 $\frac{2}{3}$ acres. |
| 5. \$20. | 28. \$2244.225. | 47. 222 $\frac{1}{2}$ bu. |
| 6. \$870. | 29. \$625. | 48. 144 yards. |
| 7. \$17.06 $\frac{2}{3}$. | 30. \$13.20. | 49. \$59.52. |
| 8. \$1092. | 31. \$3. | 50. 50 cows. |
| 9. 25 days. | 32. 65 hoes. | 51. 100. |
| 10. 625 bu. | 33. \$51. | 52. \$15.345. |
| 14. 31 hogs. | 34. 476 + gal. | 53. 15 lbs. |
| 15. 208 yards. | 35. 7 days. | 54. 4 $\frac{3}{4}$ miles. |
| 16. \$163.40. | 36. 9 $\frac{1}{2}$ days. | 55. \$3496. |
| 17. 75 pairs. | 37. 7 days. | 56. \$15.23 $\frac{1}{2}$. |
| 18. 165 $\frac{1}{2}$ lbs. | 38. \$1.98. | 57. 219000 lbs. |
| 19. \$72. | 39. 45 yards. | 58. 29105 $\frac{1}{2}$ ft. |
| 20. 240 lbs. | 40. 13 $\frac{1}{2}$. | 59. 112 men. |
| 21. \$107.80. | 41. 1500 men. | 60. \$75.60. |
| 22. 495 yards. | 42. 990 reams. | 61. 30 $\frac{1}{2}$. |
| 23. \$180. | 43. \$1168.75. | 62. 50 $\frac{1}{2}$ lbs. |
| 24. \$682.50 | 44. \$71.784 | 63. 328 $\frac{2}{3}$ acres. |
| 25. \$2.40. | 45. 20 men. | 64. 35 lbs. of each |

ANSWERS TO THE EXERCISES.

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REDUCTION OF THE DECIMAL CURRENCY.

1. \$ 6.10.
2. \$ 68.35.
3. \$ 40.20 $\frac{1}{2}$.
4. \$ 63.15 $\frac{1}{2}$.
5. \$ 94.27 $\frac{1}{2}$.
6. \$ 71.52 $\frac{1}{2}$.
7. \$ 134.79 $\frac{7}{8}$.
8. \$ 763.57.
9. \$1183.33 $\frac{1}{2}$.
10. \$ 720.12 $\frac{1}{2}$.

| | £ | s. | d. |
|----|-----|----|------------------|
| 3. | 10 | 1 | 0 $\frac{3}{4}$ |
| 4. | 9 | 11 | 10 $\frac{1}{2}$ |
| 5. | 11 | 15 | 9 $\frac{1}{2}$ |
| 6. | 17 | 17 | 7 $\frac{1}{2}$ |
| 7. | 31 | 10 | 5 $\frac{1}{2}$ |
| 8. | 94 | 11 | 10 $\frac{1}{2}$ |
| 9. | 112 | 10 | 7 $\frac{1}{2}$ |

COMPOUND ADDITION.

1. £ 108 19s. 2 $\frac{1}{2}$ d.
2. £ 165 15s. 10d.
3. £ 331 3s. 4 $\frac{1}{2}$ d.
4. £ 73 16s. 9d.
5. £ 452 3s. 9 $\frac{1}{2}$ d.
6. £2160 12s. 10 $\frac{1}{2}$ d.
7. £5381 10s. 4 $\frac{1}{2}$ d.
8. £5490 18s. 2d.
9. £3996 10s. 11 $\frac{1}{2}$ d.

10. 177t. 12cwt. 46lbs. 11oz.
11. 35 pk. 1 gal. 3 qt.
12. 48 yd. 1 ft.
13. 3218 yds.
14. 108 ac. 2 r. 6 per. 8 yds.
6 ft. 108 in.
15. 261 c. 1 c. ft. 7 cub. ft.
16. 85 wk. 3 h. 9 m.
17. 20a. 97p. 9yd. 5ft 2lin.

COMPOUND SUBTRACTION.

1. £ 18 13s. 2 $\frac{1}{2}$ d.
2. £801 9s. 0 $\frac{1}{2}$ d.
3. 19s. 11 $\frac{1}{2}$ d.
7. 8 cwt. 3 qr. 21 lb.
8. 6m. 7ft. 3r. 4yd. 1ft. 6in.
9. 16y. 359 days 23 h.
10. 19 lbs. 11 oz. 3 dr. 1 scr.
11. 9 yd. 2 ft. 11 in.
12. 3 r. 39 per.
13. 18 c.yd. 19 c.ft. 911c.in.

14. 16 yd. 3 qr. 2 na.
15. 350 deg.
16. 202 gal.
17. £694 11s. 11 $\frac{1}{2}$ d.
18. £369 5s.
19. 821 $\frac{1}{2}$ yds.
20. 1 quart.
21. 1s. 9d.
22. 1 c. 6 c. ft.

Division proves Multiplication.

COMPOUND DIVISION. 77.

- | | | |
|---------|-----------------------------|-----------------------|
| 1. 217. | 3. 502 $\frac{1}{2}$ times. | 5. 57 $\frac{1}{2}$. |
| 2. 64. | 4. 16 rds. | 6. 8. |

ANALYSIS IN COMPOUND NUMBERS.

- | | |
|---|---|
| 1. £22 10s. | 13. £14 17s. 7 $\frac{1}{2}$ d. $\frac{3}{4}$. |
| 5. £89 12s. 6d. | 14. 4 cwt. 56 lbs. 4 $\frac{1}{16}$ oz. |
| 6. £35 3s. 0 $\frac{1}{4}$ d. $\frac{1}{2}$. | 15. 28 yards. |
| 7. 148 acres. | 16. £107 2s. |
| 8. \$2112.50. | 17. 502 bu. 2 pk. 6 q. |
| 9. \$100. | 18. 5 cwt. 35 lbs. 11 $\frac{1}{2}$ oz. |
| 10. 24 yards. | 19. 58 $\frac{1}{2}$ yards. |
| 11. £6, 2s 6d. | 20. 25. |
| 12. 589 gal. 2 qt. 1 $\frac{1}{2}$ pt. | |

MISCELLANEOUS EXERCISES.

- | | |
|------------------------------------|--|
| 1. 938 each. | 18. 1285 sum, 379500 prod. |
| 2. 116 $\frac{1}{2}$. | 19. 758. |
| 3. \$9.41 $\frac{2}{3}$. | 20. 3786. |
| 4. £166 13s. 9d. | 21. \$18.79. |
| 5. 4 $\frac{1}{2}$ bu. | 22. 84. |
| 6. £477 6s. | 23. \$6760.50. |
| 7. \$250. | 24. 749640 half pence. |
| 8. \$62.40. | 25. 62468 Fr. E. |
| 9. £4 12s. | 26. \$675.66 to one and \$591.67 two, each. |
| 10. £70 7s. 3 $\frac{1}{2}$ d. | 27. A. \$255, B. \$85. |
| 11. £15 0s. 7 $\frac{1}{2}$ d. | 28. 56 gal 7 pt. |
| 12. £31 9s. 10 $\frac{1}{2}$ d. +. | 29. \$2630.685. |
| 13. £ 2 8s. 4d +. | 30. 625 men. |
| 14. 180 yd. 3 $\frac{1}{2}$ qr. | 31. £714 11s. 10d. |
| 15. 3316 $\frac{2}{3}$. | 32. £33984 3s. 6d. |
| 16. £5478 2s. 11d. | |
| 17. A. \$50.495, B. \$49.505. | |

$\frac{3}{4}$ oz.

6 q.
11 $\frac{1}{2}$ oz.

9500 prod.

pence.

one and
each.
\$85.

10d.
6d.

